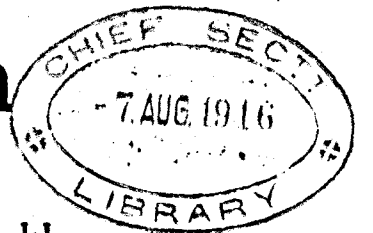


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Public Health

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THE PUBLIC HEALTH SERVICE AND THE WAR.

THE question which must be in the mind of every medical officer of health at the present time is whether there is any work in which he can share which would be of use to his country; whether he can make his special knowledge available to those who direct the military forces of the British Empire in such a way as to be of value in the great undertaking upon which this country has entered.

It is within the knowledge of all that steps were taken by the military authorities some years ago to constitute a sanitary service for the Territorial Force, and a sanitary officer was appointed to each division as adviser of the commanding officer in all matters connected with the hygiene of the troops. Further, a list of sanitary officers was published in the Army List, men whose services were to be available on mobilisation, and from these officers was to be drawn those who could render service in the event of necessity arising. It was contemplated, it has been stated, that their sphere of action would be in the localities with which they were familiar in civil life, and thus commanding officers would have accessible all the knowledge of local conditions which might be needed for the preservation of the health of troops under their command so long as the troops remained in this country.

As a matter of fact those who were thus given commissions and placed on the *à la suite* list, are but a sprinkling of the medical officers of health in this country, and the list contains the names of some who would not be thought of in connection with this object—some, in fact, who have never been attached to sanitary districts as medical officers of health. The conception then that the *à la suite* list should contain the names of medical officers of health able to supply information as to local conditions in the country either had no definite foundation or was not proceeded with. Nevertheless, the

information which medical officers of health could supply would be of material value in assisting to maintain the health of the fighting force and in mitigating any conditions militating against its fitness for work, conditions which are inevitable under the circumstances of the enrolment of many thousands of recruits and the mobilisation of the Territorial Army.

Perhaps the best way of indicating the nature of the work which could be undertaken by medical officers of health is to describe in a few words the steps which have been taken in London in the few last weeks to provide a sanitary organization for military purposes in the metropolis. When war was declared the London medical officers of health offered their services to the Deputy Director of Medical Services of the London military district. Except for certain outside areas, such as the military quarters at Windsor and Caterham, the London military district is conterminous with the County of London. The proposal, therefore, of the London medical officers of health related to all that was needed in the London command. This offer was at once accepted, and without loss of time these officers were engaged in the work of inspection of all billets and encampments, in looking into the conditions under which troops are housed, the sanitary arrangements of the buildings, the supervision of food supplies, and, indeed, all the circumstances which would have come under the notice of these officers had their sanitary authorities statutory powers in this connection. In this work they are associated with the county medical officer of health, a member of the deputy director's staff.

It is important to note that the medical officers of health thus acting have no executive functions, but are in the position of advisers of the commanding officers whose units are in the several cities and boroughs of London. The whole intention of the introduction of sanitary thought into military life is to look to the combatant force as executive.

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From the private soldier who is taught to have regard to personal hygiene and to carry into effect the teaching which he receives, to the commanding officer who is responsible for the health conditions under which his men live, the duty of action remains with the combatant. The part of the medical officer is that of adviser, and this position has been carefully maintained in the London arrangements.

There are other branches of work which may fall to the medical officers thus acting in London. As yet there has been no indication of introduction of disease from abroad, as the result of the return of those who come home from the seat of war. The future only can show whether we shall remain exempt. Soldiers have returned with bowel disturbances due to exposure, and to irregularity of diet incidental to war, but true dysentery is not known to have manifested itself among them. Enteric fever has not been conspicuous, and nothing has been heard of cholera except certain occurrences of this disease in Hungary among wounded soldiers returning from Galicia, and more recently in Vienna, where, it has been stated in the press, it has appeared among the wounded brought back to that city. Smallpox has not yet declared itself, but the war is only beginning, and medical officers of health may in connection with epidemic disease yet find that they have to take part in safeguarding the troops at home.

There is indeed a useful rôle to be played by medical officers of health in association with the military authorities, and no one can doubt their willingness to do everything in their power.

One other matter may be referred to which medical officers of health might well undertake and that is to encourage to the utmost of their ability preventive inoculation against enteric fever among men entering the Regular Army or Territorial Force. The value of this means of prevention of disease is now beyond doubt, and the experience of the South African War has taught what mischief to the fighting force this disease may cause.

THE LATE SURGEON-GENERAL SIR ANTHONY DICKSON HOME, V.C., K.C.B., M.D., who died aged 87, at 7 Palace Gardens Terrace, W., was a Crimean and Indian Mutiny veteran, and formerly Principal Medical Officer in Ashanti, in Cyprus, and in India. He left estate of the gross value of £24,607.

THE PROBLEM OF AFTER-CARE IN ANTI-TUBERCULOSIS WORK.

By ADAM WHITE, M.B., Ch.B., D.T.M. & H., D.P.H.,
Chief Tuberculosis Officer the Northern District of
Staffordshire.

IN the time previous to the initiation of the present anti-tuberculosis campaign, those members of what is familiarly known as the working class who were so fortunate as to be sent to sanatoria were left pretty much to their own devices when they were discharged from institutional life. By this it is not meant that these patients did not receive medical attention, because, as a matter of fact, many of them were the subjects of a degree of painstaking professional skill which was ill requited by the disappointing results which were obtained in a large number of cases. It must also be admitted that in individual instances, through the exertions of the practitioner in charge of the case and of such interested persons as employers, clergymen, social workers, etc., efforts were made to place the ex-sanatorium patient in such hygienic conditions as would help him to resist a recrudescence of his disease. But even admitting that all this is true, it is quite beyond question that the environmental conditions (both those of the home and those of the workplace), the sociological status, and the general routine of life of the majority of these unfortunates did not receive that attention which their importance in the etiology of phthisis—a disease intimately and notoriously connected with states of general environmental mal-hygiene—merited for them. What could it profit these patients to bring their disease to a state of arrest and then, when this desirable consummation had been attained, to send them back to live under the conditions which had in the first instance at least contributed to the initiation of the morbid process? No permanent good result could be expected from such a series of events. The case of patients whose disease had not been actually arrested was even worse, for they were re-subjected to the action of what may be called the tuberculo-excitant environment while the disease was still active. According to the working scheme which is being adopted by the majority of county councils and county borough councils, an effort is to be made to concentrate a special degree of attention on the patients' surroundings, and in the case of ex-sanatorium patients—who will constitute the largest number of those treated—to adequately follow up the institutional treatment which the case

has received. The work demanded in connection with this effort will be undertaken by the after-care organisations which are in operation in the individual areas.

Now, in order to be effective, after-care organisations should embrace the entire general supervision and treatment of each patient, and in these organisations all the agencies which can be brought to bear upon the patient and upon his circumstances and environment must be co-ordinated in such a manner as to make them produce the maximum of accomplished work. Before attempting to co-ordinate these active agencies it should be helpful to examine the field of after-care in detail, to consider its various branches or components, and to endeavour to find out to what degree and how best these varied branches can be served by the individual agencies which are available.

The following table sets out some of the principal components of the great field of after-care:—

1. The treatment of the individual patient and the provision of adjuncts to treatment.
2. The remedy of unhygienic conditions prevailing—(a) In the patient's home environment; (b) in the patient's working environment.
3. The assistance of the patient in the finding of work—(a) At his former occupation; (b) at a new or specially suitable branch of his former occupation; (c) at a new occupation.
4. The prevention of the spread of infection.

As regards treatment, there are two general varieties which at present engage attention; these are known respectively as dispensary treatment and domiciliary treatment. Now, though it may be convenient for the purpose of fixing individual responsibility, to refer a patient to one or the other of these forms of treatment, it is doubtful if it is in the best interests of all concerned that this distinction should be pressed to the extent of drawing a hard and fast line between the two forms, for it is highly probable that events will go to prove that the most efficient method is a working combination of the two. Article 2 of the Local Government Board's "General Order: Domiciliary Treatment of Tuberculosis," of July, 1912, contains provisions which, when they are properly acted up to, are bound to make for an organised connection between the domiciliary and dispensary sides of the general scheme.

Shelters are valuable adjuncts to treatment, and they enable the patient to make an honest and whole-hearted attempt to carry out sanatorium régime under home conditions. Moreover, they act as ever-present reminders to the ex-sanatorium patient that he must continue to live by rule. When provided to suitable cases and when properly supervised, shelters take a place in the after-care scheme which can be adequately filled by no other one provision. Up to the present time in most parts of the country shelters have been provided only to such cases as have good accommodation for the structure in the immediate neighbourhood of the dwelling. Such a method of procedure introduces into the selection of cases for shelter treatment a criterion which is undesirable, though it is admittedly, as matters stand at present, unavoidable. For the reason that a proper and convenient situation for the shelter is not available, many cases which are otherwise eminently suitable cannot be provided for. One method of overcoming this difficulty would be by the formation of shelter colonies. As the absence of yards and gardens of adequate size is most in evidence in urban districts, it follows that these colonies would find their sphere of greatest usefulness in such areas, and as in an ideal scheme of this kind the inhabitants of the colony would be following their usual avocations, and as the matter of distance from the workplace might present practical difficulties in the case of the larger towns, it is apparent that as a working proposition the foundation of such colonies could be carried out most conveniently and with the greatest hope of success in the smaller urban aggregations of population. The cases best suited to become inmates of such colonies would be found among those individuals capable of doing a full day's work, who did not have suitable facilities for the use of a shelter at home, and whose housing conditions were particularly unsatisfactory.

The site of such a colony would require to present the conditions of exposure, freedom from smoke and emanations, elevation, etc., demanded by the laws of hygiene. It would be best to have it on the outskirts of the town at a place from which the working centres could be easily reached. In some cases a suitable situation might be found in the grounds of the local isolation hospital or on land adjoining the policies of that institution, and, taking into account the question of administration, such an arrangement would present many practical advantages.

The actual buildings of the colony would consist of two principal units, the shelters themselves and a central building. The functions of this latter would vary with the mode of working of the colony. The colony might be used purely for residential purposes, the colonists taking their meals outside—for example, at their own homes. In this case the central building would be used almost solely as a place where dressing, undressing, and personal ablutions were performed; for, except in the warmest of weather, the ordinary shelter is quite unsuitable as a place for changing clothes, and the laying on of water could be more readily and conveniently carried out at one special building than at the individual shelters. The central building would also contain quarters for the caretaker or supervisor and washing appliances for the washing of the bed linen, etc., and, in addition, it might be convenient to have the means of excreta removal installed in connection with it. Laundry apparatus would not be necessary if the washing were done at the homes of the individual patients or if it were placed out at contract. As regards excreta removal, if the installation of the water carriage system presented monetary difficulties, well-managed earth closets would serve the purpose. In the case of a colony which was used purely for residential purposes, the patients on rising in the morning would go to the central building there to wash and dress. They would then make their own beds, and go to their homes for breakfast before proceeding to work. In the evening they would return to the colony after having partaken of supper. In another method the central building would serve the additional purpose of a catering unit where meals were cooked and served. In this case the colonists would return for meals during the day. Perhaps the most workable variety of this system would be that in which breakfast and supper were taken at the colony and the midday meal at the patient's home, at his workplace, or elsewhere. In some cases it might be possible to run the catering department on the principle adopted in the kitchens of many common lodging-houses, where the inhabitants cook their own meals.

The immediate supervision of the colony and of its inhabitants would be best carried out by someone resident at the central building. This resident supervisor would require to be a female in the case of colonies devoted to the reception of women or of both the sexes,

but where the colony was intended solely for men the supervisor might be a man. In any case, he or she would need to be thoroughly imbued with the principles of the open-air life. On the whole, it would be best to have separate colonies for each sex, but, in the presence of adequate safeguards and proper supervision, it would be possible to run combined colonies. On the other hand, taking into account the cost of separate conveniences, etc., and the increased expense of administration generally, it is doubtful if two separate colonies would be much more expensive to maintain than a combined one. From a consideration of the above details, it will be apparent that the running of such a shelter colony in conjunction with an isolation hospital would reduce both the initial cost and the cost of maintenance. A suitable supervising staff would be available, and unused ward blocks would take the place of dining- and dressing-rooms. It is not suggested that these colonies should take the place of the sanatorium proper. They are intended for the class of case to which reference has already been made, and which has previously undergone a course of educational institutional treatment. Such colonies would to some extent answer the purpose of the larger colony scheme advocated by Dr. J. E. Esslemont,* although, of course, in the former there would be no actual segregation, for the patients would be working outside the colony.

Since tuberculosis is a disease which in a large number of cases is definitely etiologically related to privation, and since in the treatment of the disease the exhibition of adequate and suitable nutriment and the protection of the patient from chill by the use of proper clothing and footgear are factors of the first importance, it is essential that every practicable means should be taken to ensure that the phthisical person has such general provision made for him as is possible and requisite in the individual case. As regards insured persons, the operation of sickness benefit and of permanent disablement benefit, and the provision of "extra food and nourishment" should in this respect be highly beneficial. So far as the uninsured are concerned, much should be accomplished with the help of local charitable organisations, and in suitable cases the means at the disposal of the Poor Law administrators should not be neglected. Under this head also must be

* "Tuberculosis: Its Eradication."—*The Medical World*, August 7th, 1913.

mentioned the provision of meals for school children by the local education authority.

The remedy of unhygienic conditions prevailing in the patient's environment should take a prominent place in any scheme of after-care, for as a rule it is these same conditions which have led up to the initiation of the morbid process. It will be most convenient to leave the consideration of the employment environment till later and for the present to concentrate attention upon the home surroundings. In this branch, the home following-up branch of after-care, the medical officer of health, the sanitary inspector, the tuberculosis nurse, and the tuberculosis officer will work hand in hand. In this connection the conditions in county boroughs are simpler than those prevailing in county areas. In the former the local sanitary authority and the local tuberculosis authority are identical, whereas in the latter the county council is the local tuberculosis authority, but the main public health powers are vested in the various district councils of the county area. In the case of county districts, however, unification and co-ordination may be secured by the appointment of the tuberculosis officer as an official of the different district councils; and in at least one area this has been done. The investigation of home environment will be carried out by means of a series of inspections made by the nurse and the tuberculosis officer. A due amount of discrimination will have to be used with regard to these visits, and in some cases it will be unnecessary or indeed prejudicial to make one. The inspections carried out under this head should be concomitant with and should supplement or be supplemented by those made in connection with the Housing (Inspection of District) Regulations of 1910. By this procedure the greatest return of accomplished work will be obtained. It is to such matters as overcrowding, defective lighting and ventilation, dampness, general uncleanness, etc., that the tuberculosis officer should specially direct his attention, for it is such conditions as these which are of paramount importance in the epidemiology of tuberculosis. A considerable proportion of the artisan and labouring class phthisical population is living under overcrowded conditions according to the Census Commissioners' standard (over two persons per room, including kitchen, etc., but not scullery), and there is no doubt that this standard errs on the side of leniency, for it takes no account of the size of the rooms nor of the manner in which they are

occupied. This aspect of the question of excessive aggregation under a single roof is of course merely a part of the larger issue of the housing of what is euphoniously termed the working class and, as a part of that issue, it awaits an appropriate solution. But in cases where the overcrowding is not absolutely gross something may be done to reduce it by an endeavour to secure a more even distribution throughout the house of the inhabitants when at rest. It is doubtful if the use of a room as a sleeping and living room is strictly in accordance with the dictates of the goddess Hygeia, but it is certain—and this is especially the case when a phthisical person is an inmate of the house—that it is better policy to put the living room to such a dual use and keep the number of resting inhabitants in each room at something like a normal level than to have the sleeping rooms proper overcrowded and the living room empty. This more even distribution of the inhabitants when at rest can often be secured by the provision of a bed and bedding.

Defects of lighting and ventilation are very common, and it is of prime importance that these should be remedied so far as is possible. When engaged upon housing inspections, one cannot fail to be impressed by the frequency with which one encounters the unopenable window. Many such windows were undoubtedly originally intended to be openable but have become fast by neglect or misuse or by the voluntary efforts of the tenants; on the other hand, a considerable number of these windows—and this is especially the case in very old properties—have been purposely constructed to remain permanently closed. The former class can be dealt with at a comparatively slight cost, but the remedy of the latter is a more expensive matter. In dealing with such defective windows, when they are of the sash variety, it might be convenient in some cases to prolong the lower end of the lower sash in order to make a permanently acting Hinkes Bird ventilator. It will be found that many windows as well as being unopenable are of quite inadequate size, and when alterations are being effected care should be taken to have the window area increased. The window area clear of the sash frame should be equal to at least one-tenth of the floor area. The other means of ventilation of the rooms demand attention. The original model bye-laws for new buildings require that where a habitable room of a house is without a fireplace and a

flue leading therefrom, it must be provided with a special and adequate means of ventilation in the shape of a sufficient aperture or air shaft with an unobstructed sectional area of at least one hundred square inches. In a vast number of three and four-roomed houses the bedrooms have neither a fireplace nor a special ventilating aperture.

The influence of the back-to-back type of house on the phthisis death-rate has long been recognised. There is also another variety of house which, although it is not exactly of the back-to-back type, is so relatively or actually deficient in ventilating openings (windows or doors) at the rear that there is little or no through ventilation. Such houses are found especially in the neighbourhood of embankments. The ex-sanatorium patient should be advised to avoid both these types of dwelling.

Dampness of ceilings, floors, and walls, while it is often due to the absence of a damp-proof course and to other inherent structural defects (and in these cases demands for its remedy building alterations of magnitude and great expense), is also frequently caused by conditions which are more easily and cheaply dealt with. Examples of such conditions are broken and displaced roof slates, defective eaves gutters and rain-water piping, and faulty yard and street channelling.

Uncleanliness of the dwelling, especially when it is coupled with conditions of defective lighting and ventilation, undoubtedly predisposes to relapse. Such uncleanliness is generally due to the habits of the housewife and the other tenants; but where floors and walls are damp and in disrepair there is little inducement to these people to persist in efforts to preserve the house in a cleanly state; and in cases in which uncleanliness is due to structural defects or is predisposed to by them it will be most practical to have the house put into proper repair first, before expecting the tenant to keep it in a state even approaching to that of the proverbial new pin. But we must remember that this condition of domestic uncleanliness, in so far as it is due to the habits of the tenants, can only be combated by education, and it will be the peculiar duty and privilege of the health visitor to provide this education. Moreover, inasmuch as example is better than precept, the plan adopted by the London County Council has much to recommend it. According to this scheme a number of working-class houses in the poorer parts of the metropolis are to be

furnished and used as educational centres for the surrounding population. As has been already said, the problem of the housing of the working classes awaits a solution, and we cannot hope to revolutionise all at once the home conditions of one variety—the tuberculous—of these classes. All the back-to-back houses cannot be closed, all the insanitary dwellings cannot be swept away for the reason that there is at the present time an actual shortage of working-class houses. There is, however, one thing that can be done, the dwellings can be made as hygienic as circumstances permit, and, pending the fruition of an organised housing scheme, the people can be taught to expect, ask for, and appreciate a type of house which is more compatible with the perpetuation of good health and the prolongation of life than is the present-day average artisan dwelling.

For the ex-sanatorium working-class patient who is capable of it, work is economically necessary and therapeutically advantageous. The mental effect of the performance of productive labour is very marked, and there should be an endeavour to have all cases which are capable of work taking part in some form of occupation. As a rule, it will be best for the patient to return to his former employment, provided that it is not inherently prejudicial. Generally speaking, his earning capacity is greatest here, and the resumption of work already known makes no additional call upon the adaptability of the patient. Where the usual employment is for any reason inherently unsuitable or prejudicial an endeavour should be made to obtain work for the patient at a new or special branch of his former occupation or at a different occupation. In the majority of cases such endeavours are faced by great difficulties, but the trouble involved in overcoming these obstacles is amply repaid by the results obtained. It has been suggested that local authorities should recruit their tram-drivers and tram-conductors etc., from the ranks of ex-sanatorium patients, and there is something to be said in favour of such a procedure, although one must admit that the precedent of a public authority actually differentiating in favour of the diseased in its selection of employees is one which is not altogether desirable. One of the difficulties which are associated with the return of the patient to remunerative employment has to do with his infectivity. At the present time there is abroad a grossly exaggerated fear of the

infectiousness of phthisis, and every endeavour must be made to instil into the public mind the knowledge that in this respect tuberculosis is not comparable to the acute infectious diseases, and that, in the language of Cornet, "the consumptive in himself is almost harmless, and only becomes harmful through bad habits." The memorandum on this subject recently issued by the Royal College of Physicians materially strengthens the hand of those whose desire and business it is to overcome this fear. As a means of providing work for the ex-sanatorium patient the foundation of farm colonies has been advocated, and at the present time such a colony is being run in connection with the Edinburgh scheme. In the majority of areas, however, the initiation of these units is not being immediately considered, and for the present, at least, it will be necessary to do without such institutions. The remedy of any prejudicial conditions prevailing in an occupation which the patient has perforce to follow is the natural alternative to a change of employment, and there is little doubt that good results should attend endeavours directed to this end. An investigation of the working conditions should be systematically carried out in all cases in which it is practicable and judicious to do so, and the aid of the factory inspector and of the medical officer of health should be invoked when such aid is necessary and desirable.

Means directed to the prevention of the spread of infection should take a prominent place in all schemes of post-sanatorium supervision and treatment, for, next to curing the patient and so causing him to cease excreting bacilli, it should be our endeavour to prevent the passage of living organisms from the infected to the presumably non-infected. Endeavours in this direction can be best carried out on the lines of the so-called cordon system of isolation, a system which has been adopted in many segregation hospitals devoted to the reception of those suffering from one or other of the acute infectious diseases, and which has as its foundation the surrounding of the patient by a ring or cordon of precautions. In the case of phthisical persons, such precautions must aim especially at the collection and effective sterilisation of the sputum. Such effective sterilisation can be readily accomplished at sanatoria by the use of special destructors or boilers, but in the homes of the poorer classes it is a matter of great difficulty. It is generally recognised that the best procedure

is that in which the patient expectorates into some form of sputum receptacle, which may or may not contain a disinfectant solution, but opinions differ as to the best method of ultimately dealing with the excreted infective material. In many instances the patient is counselled to empty the sputum at regular intervals on to a bright fire. Now even when the fire is really bright the result is not altogether desirable, for the liquid splutters, makes a mess of the grate, and much of it is discharged into the room in the form of minute semi-inspissated particles. It is reasonable to suppose that the bacilli in the centre of these particles have not been killed by the heat, and that the general effect upon the atmosphere of the room is similar to that produced by the unguarded coughing of a phthisical person. In cases where the sputum has not been previously mixed with a disinfectant it is highly probable that large numbers of virulent bacilli are discharged into the air by this process of so-called cremation, and in cases where the sputum has been previously mixed with an efficient disinfectant, and has been permitted to be in contact with the disinfectant for a sufficient length of time, the procedure, though probably not in itself dangerous, is quite unnecessary as well as being far from elegant. To put the matter shortly, we may say that it is impossible to effectually cremate sputum in such fires as are usually found in working-class dwellings, and that the proper way to deal with such sputum is to treat it in a manner similar to that adopted in the case of typhoid stools. It has been suggested that cremation may be rendered effectual by the preliminary admixture of the sputum with sawdust, but this involves an amount of trouble which it is foolish to expect the patient to take when we can provide him with a method which is certainly simpler and which, to say the least, is quite as good. It has been shown that certain disinfectants in a strength of one-half per cent. will, under severe test conditions, kill tubercle bacilli in three hours; and there is good reason to suppose that, under ordinary conditions, and when the germicide is used in an initial strength of two per cent. (producing a concentration of one per cent. when mixed with an equal volume of sputum), this lethal result is obtained in a shorter time and that a similar train of events will follow the use of other standard disinfectants. Each patient who is discharging infective sputum should therefore be provided with a

suitable receptacle and with a disinfectant of known germicidal efficiency. The sputum will be received into the disinfectant, and the mixture can then at stated intervals be emptied down the water-closet or into the privy as the case may be. It is, of course, highly undesirable that sputum should be discharged into a drainage system or privy, etc., without previous treatment. Such a procedure cannot be defended by saying that tuberculosis has never been proved to be transmitted by water. When we remember the length of time which tubercle bacilli can live in distilled water and in putrefying material, we must admit that no one has authority for predicting the following of a harmless result upon the entrance of large numbers of virulent organisms into a sewerage system. In dealing with infective cases the other precautions which are adopted will vary with the necessities and possibilities which are presented in the individual instance. The ideal is to have the patient sleeping in a bedroom by himself, and using a set of food utensils which are kept separate from those in use by the household generally. In cases where the provision of a bed and bedding will enable proper sleeping isolation to be carried out it is the undoubted duty of the local tuberculosis authority to make such provision. The provision of paper handkerchiefs, etc., in cases where the use of such is desirable follows as a natural sequence. In instances in which the patient is living in conditions of squalor the periodic cleansing and disinfection of the house by the local sanitary authority should be systematically practised.

OBITUARY.

KILLED IN ACTION.

We regret to record the death of Lt. H. Leslie Hopkins, R.A.M.C., formerly Assistant County Medical Officer of Health of West Suffolk, who was killed during the fighting in France on September 19th.

We also regret to announce the death of Lt. Dundas Manley, of the Royal Engineers, one of the sons of the late Dr. Herbert Manley, for many years medical officer of health of West Bromwich, and formerly Hon. Secretary of the Society of Medical Officers of Health.

Dr. HOPE, the medical officer of health for Gloucester, is acting as *locum tenens* during the absence of the medical officer of health of the Gloucester R.D.C., who has been appointed by the Admiralty to a post on the *Mauretania*.

THE DISORDERS OF SPEECH.

By HARRY W. WHITE,

Author of *Speech for the Dumb; The Mechanism of Speech*, etc.

THE subject of this article must be regarded by all thinking persons as of first-rate importance, and therefore is worthy of a place in your Journal, which devotes itself to the physical and social well-being of the community. The writer is deeply conscious of his own limitations, but would venture to put before you some of the salient points connected with the various disorders of speech from a practical point of view, and in such a manner as to be intelligible to all readers.

Before proceeding to the main subject of our article, perhaps it would be as well to deal briefly with the organs employed in speech.

There are three sets of organs required, and these must work co-ordinately if good speech is to be attained.

1. The organs of respiration.
2. The organ of phonation.
3. The organs of articulation.

The organs of respiration are situated in the thorax, and contain the material for voice and speech. They are, briefly, the lungs with the air passages, the diaphragm, the costal and intercostal muscles, with nerves and blood vessels. In the case of male breathing (which includes girls up to the age of puberty) the diaphragm is depressed by the act of inspiration, thus encroaching upon the abdomen.

In the female form of breathing, the abdominal movement is not so pronounced, but the thoracic cavity is enlarged by the elevation of the ribs. The organ of phonation, or larynx, is a cartilaginous box-like structure, situated at the top of the windpipe, of which it might be regarded as an enlargement. It is composed of cartilages, ligaments, membranes, nerves, muscles and blood vessels, and contains the true vocal chords, the only ones with which we have to deal. The chief cartilages are the thyroid (which occupies the whole front of the larynx), the cricoid and the arytenoids.

The vocal chords are anteriorly attached to the thyroid cartilage in its angle, and stretch from before backwards to be attached to the apices of the two arytenoid cartilages.

The space between the vocal chords is called the glottis, this being maintained during

ordinary respiration, but considerably modified during vocal action. The production of voice, caused by the vibration of the vocal chords, does not mean that the glottis disappears, this only occurring, in the opinion of the writer, during the production of the short vowels, which are to all intents and purposes explosives. The organs of articulation are situated above the larynx and serve to modify the voice and breath issuing therefrom. They are the pharynx, tongue, teeth, lips, hard and soft palates, cheeks, and nose. They each and all have their functions to perform, and any defect in their conformation will necessarily have some influence upon the articulation. The foregoing remarks do not apply to the cheeks, where malformation is impossible. The cheeks, however, are employed in the forward labial movements, notably in *w* and *oo*, and in cases of facial paralysis, where the buccinators are impaired, the articulation does suffer. Speech is made up of a succession of sounds (vocal and non-vocal), and each language employs its own method as to how these sounds shall be arranged.

The vocal sounds have a larger share in speech than the non-vocal, there being 75 per cent. of the former to 25 per cent. of the latter. The number of sounds altogether is 48, of which 30 are articulations and 18 are vowels. It will be here observed that the word "articulation" is used rather than "consonant," this being due to the fact that the former word better expresses its meaning. The word "consonant" means *sounding with*, and describes the name of the letter, as B (*bē*). To obtain the "power" of this letter in ordinary speech, you must eliminate the vowel, and thus you arrive at its true value. This then is clearly capable of being pronounced by itself, and must be regarded as a joint of speech, or articulation. The essential difference between an articulation and a vowel lies in the fact that whereas the former is wholly or partially obstructed by the organs of articulation in their passage through the mouth, the latter have free egress.

In the case of the short vowels, however, there is a distinct stop in the larynx, caused by the complete contact of the vocal chords, which imparts to these elements the nature of explosives.

Perhaps it will be of interest at this stage to classify the sounds which go to make up speech,

and the following table may be a convenient form of viewing them:—

ARTICULATIONS.											
Non-vocal.			Vocal.								
Continuous.	{	h	The Aspirate.								
		wh w	Labial.								
		f v	Labio-Dental.								
		th th	Linguo-Dental.								
		s z	Sibilant.								
		sh zh	Do.								
Explosive.	{	y y	Linguo-Palatal.								
			l	Do. (Lateral vibration).							
			r	Do. (Frontal vibration).							
		p b	Labial								
		t d	Anterior Linguo-Palatal.								
		k g	Posterior Do.								
		ch j	Compound.								
		x (ks) x (gz)	Do.								
			q (kw)	Do.							
NASALS.											
			Vocal.								
			m	Labial.							
			n	Anterior Linguo Palatal.							
			ng	Posterior Do.							
			nk (= ng + k)	Do. Do.							
THE VOWEL SOUNDS.											
Short	{	a	...	...	...	...	as in father.				
		ā	...	...	...	...	...	fall.			
		oo	...	...	...	...	...	food.			
		ou	...	...	...	...	...	foul.			
		ō	...	...	...	...	...	foal.			
		ér	...	...	...	...	...	fern.			
		oo	...	...	...	...	...	foot.			
		o	...	...	...	...	...	fox.			
		er	...	...	...	...	...	ferment.			
		u	...	...	...	...	...	fun.			
		a	...	...	...	...	...	fan.			
		e	...	...	...	...	...	fen.			
		i	...	...	...	...	...	fin.			
		i	...	...	...	...	...	fine.			
		oi	...	...	...	...	...	foil.			
		a	...	...	...	...	...	fail.			
		e	...	...	...	...	...	feel.			
		u	...	...	...	...	...	fuel.			
CLASSIFICATION OF THE VOWEL SOUNDS.											
Lingual Simple.			Neutral.			Labial Simple.					
Long.		Short.			e	Long.		Short.			
er		er			e	ā		o			
		u				oo		oo			
		a									
		e									
e		i									
Mixed											
Lingual Compound.			Ling. and Labial.			Labial Compound.					
i			oi			ou					
a			u			ō					

Upon analysis we find that the lips are called upon to act 9 times as against 12 times by the tongue in the vowel movements.

In the case of the articulations the proportion is 14 times to 24 in favour of the tongue. We have so far only dealt, in the briefest possible manner, with the organs of speech and the various single elements that it is necessary for these organs to negotiate, but it must be borne in mind that many of these sounds have to be

allied, as; for instance, "tl" in cattle, "dl" in handle, "tn" in cotton, "dn" in sudden, "km" in complete, etc., so that the difficulties the abnormal child has to encounter are far greater than would appear at first sight.

With this long, and, I fear, tedious preface, we will now proceed to deal with the main subject of the article, viz., The Disorders of Speech.

These may be enumerated as Stammering, Stuttering, Lalling, Defects arising from cleft-palate and Spastic aphonia.

Stammering.—This painful affection of speech is by far the most common of all, and is familiar to people of all countries. It may be defined as a difficulty in enunciating words easily and fluently, causing considerable muscular disturbance (especially facial), which is distinctly not of local or peripheral causation. It will readily be seen that when once this condition is set up how hopeless is the case of the sufferer; undirected force being no remedy, but only tending to "make confusion worse confounded." Let us suppose that the first word in the sentence is "shall," the effort of the stammerer might produce sh—all indicating a want of promptitude in obtaining the voice for the vowel, the lungs in the meantime being all but exhausted. It is perfectly true that there is delay in the laryngeal action, but this is not the cause of the trouble.

In the early part of this article it was stated that the three sets of organs responsible for the production of speech had to work co-ordinately if normal results had to be obtained, and here we find a want of harmonious action in the organs controlling the breath, with the result that the larynx is overwhelmed and found unprepared. It may be taken as a physiological fact that the breath never leaves the lungs undirected by the "Will" in the normal subject, consequently when it arrives in the regions of the vocal and articulating organs it finds everything in readiness, and natural speech follows.

If we enquire further into this, we shall find that the inspiration was hurried and jerky, not easy and well-ordered, and it may be confidently asserted that where such a manner obtains irregular speech must ensue. Why does such a state of things exist? is frequently asked. It is most difficult to give any definite reason for stammering. It clearly is not indicative of want of intelligence, but is very frequently connected with the neuropathic diathesis.

The daily case book shall now speak for itself. Upon opening the book casually, and taking 50 cases, we find 26 declared as hereditary, making 52 per cent. When, moreover, we take into consideration the fact that some parents are loth to admit hereditary taint, as indicating a stigma upon themselves; and that in other cases the facts are not really known, and thus wrong information is supplied, we may take it that 60 to 65 per cent. would in no wise be an exaggerated estimate.

Fancy such figures as these in the light of the statements that are made in regard to heredity!

We take the view, therefore, that the chief cause of stammering is hereditary transmission, not necessarily direct, as cases have been known where it was traced to collateral relatives living abroad, and who had never seen the subject of the investigation. Some hold to the theory that it is not due to transmission, but is in a large part owing to imitation of a parent's speech by children.

There is little, however, to recommend this to the smallest consideration, seeing that in many cases where there are seven or eight children, only one develops an irregular method of speech; that this child presents every evidence of nervous trouble, and further, as an interesting fact, it generally happens that the one affected is the only boy in the family. Why should this be? There is a reason for it, but it is a scientific theory only. The opinion of one of the greatest living authorities on the nervous system is that the net-work of nerves in the boy is finer and less capable of resisting the hereditary predisposition than in the case of the girl, and as this phenomenon is so consistently forced upon us, no doubt there is a great deal to support this view. In regard to the question of the disorder being due to imitation, it is possible that a few of such cases have occurred, but only where there was a predisposition; consequently, no great alarm need ever be felt in this direction. Many parents have stated that their child acquired it by imitating the gardener, or some school-fellow, when in reality the case was one of heredity. There is a rooted objection with some people to admitting a congenital defect—they derive some satisfaction in describing it as an acquired one. Seeing then that this condition of stammering is referable to the nervous system, and that its most obvious cause is a want of control of the breath, perhaps it

would be as well to caution persons against breathing exercises as a means of improving the speech.

It is quite a common thing to hear of persons having breathing exercises, and I would here and now point out the danger of such treatment. It sounds very fine, of course, but seeing that the trouble is really an inability to deal with the breath as it exists, why develop the lungs and increase their capacity? It would be tantamount to assisting your enemy to receive reinforcements while you are engaging him! Increasing the pressure of breath is only adding to your difficulties, because there is a corresponding increase of muscular contraction, and this tends to spastic action.

The way to proceed with a child who stammers is to teach him to control the breath he has, and later on he can have breath exercises (which are, of course, healthful) without any possible danger. Great care should be taken upon seeing a case to get at the family history, the general health and habits of the patient, as all this will be found of material assistance; further, there should be a thorough and exhaustive analysis of the speech taken at the time, as by this means you can classify the case and proceed to treat it on scientific lines.

As we have been dealing with breathing, it would be opportune to refer to the erroneous and very prevalent view that respiration should at all times be conducted through the nose. There are two kinds of breathing, the active and the passive, the former being that employed during the action of speaking and the latter being the ordinary and involuntary form for the purpose of preserving life.

In the active form the breathing is carried on through the oral channel, and it is only necessary to closely observe anyone reading aloud, or speaking, to prove this physiological fact. Where we find evidence to the contrary it will be found that there has been a course of lessons in elocution, and an attempt made to improve upon Nature! The effort necessary for speech induces a much fuller form of respiration, and to attempt at this time to replenish through the nasal cavities is both laborious and exhausting and opposed to the natural law.

During quiet respiration, which means at all times other than when speech is in progress, the natural channel is the nose. This is mentioned in order to counteract the advice so freely given by unthinking people. Another fallacy which has caused unspeakable sorrow is

the advice given by certain medical practitioners whom parents have consulted in regard to their stammering child. The parents are comforted by the formula, "He will grow out of it." It is not too much to say that this is a mere evasion of a difficulty, unsupported by any evidence, and seeing the far-reaching and disastrous results that follow, is a course to be strongly condemned. There are a large number of medical men dealing with the nervous system, and it is to one of these that the parents should be referred.

Another fallacy is the expectation to find some visible cause for stammering contained within the mouth, or, in other words, some organic defect. No such thing will ever be found, as stammering is in no way associated with the conformation of the organs of the articulative mechanism. What, however, is obvious to the expert is the undue secretion of saliva, combined with the trembling tongue and the twitching lower lip. All these, however, are simply indications of nervous disease in various degrees.

Proceeding to the treatment of stammering, the first thing to do is to gain as much knowledge as possible of the particular case you are about to treat. Then it will be found a good plan to introduce the patient to the organs of speech, briefly and simply dealing with their anatomy and physiology. By this means you arouse an interest in the subject, and prepare the way for the important work that is to follow. You are then guided by the circumstances of the particular case, and proceed to give exercises that will fit the difficulty.

The various forms to be met with demand special attention, but it must be borne in mind that there is no absolute line of demarcation between one case and another, but only a strong inclination to one side or the other. For instance, you could not affirm that one person hesitated always on "s," while another invariably experienced a difficulty with "k"; such would be contrary to practical experience, but you could regard them as likely to lean to one side or the other. The non-vocal continuous sounds—"f," "sh," "s," and the like—come up through the open glottis and pass through the oral cavity, only meeting with partial obstruction, by one organ or another. As they are uninterrupted in their course, and can be continued so long as the breath lasts, they are called continuous sounds.

The opposite class—"p," "t," "k," and "ch"—are completely stopped by the lips or tongue,

and as the soft palate is raised at the moment there is no outlet until the organs are separated.

The nasal group—"m," "n," and "ng"—are free to pass through the nasal cavities, as the soft palate is depressed, while the lips and tongue assume the same positions as for "p," "t," and "k."

It is generally admitted that the explosives are the most difficult of all, as the vowel has to be taken up from a stop position, whereas in the case of the continuous, the breath is on the move.

The nature of all these movements must be thoroughly explained and the nasal and explosive equivalents contrasted. All these exercises, however, will prove of very little value unless accompanied by the physiology of active breathing and the science of speech. This latter includes the action of the mind during the utterance of words. There can be no doubt that the whole thing is a question of mental attitude, and the more the mind can be directed to the process the better. Take, for example, the words "port" and "peak," and watch the action of the mind in each word. Just before opening the lips in the first it will be found that they are beginning to incline forward in preparation for the "or," whereas in the second word a directly opposite movement is taking place, and we find the tongue very active laterally, and in firm contact with the upper back teeth. Why is this so? Is it by chance? Surely not, as it occurs on every occasion, and clearly points to mental direction. The patient's attention must be drawn to these facts and his mind stimulated to do what it is intended to do.

Then, again, in the vocal action which is necessary in the case of the vowel, the mind must be centred on the larynx, and the prompt action of the vocal chords will ensure the release of the explosive—the real difficulty.

All the sounds in the language must be dealt with in this way, separately and allied with others.

The double sounds are divided into two classes, the consecutive and the concurrent, the names being in accordance with their physiology. To the former class belong such movements as "sl" in slope, "sw" in swim, "sp" in speak, and it will be noticed that the two positions are taken up consecutively. The latter class comprise such movements as "pl" in plant, "tr" in train, "cl" in class, and "gl" in glow, and observation will here disclose the fact that the two positions are

assumed together before proceeding to the vowel, hence the name concurrent. We frequently find that the diaphragm by spasmodic contraction interferes with the output of breath even in the middle of a word, so that it cannot be too often impressed upon the patient that the breath is continuously moving from the lungs during the progress of a word, notwithstanding the fact that an explosive may be encountered on the way. This does much to induce the constant and uninterrupted movement of the breath—a great desideratum. Another very serious trouble in commencing a sentence is the inability of the patient to attain the first position before the breath is set in motion, clearly indicating a false mental attitude. This must be carefully pointed out, and the hand placed upon the epigastrium at the moment of inspiration in order to ensure the passivity of the diaphragm until after the position is seen on the organs of articulation. It is highly important to call attention to the vocal action, as it does much to prevent the exhaustion of the lungs, due to the mind being withdrawn from the whole process. One often hears the opinion expressed that it is quite impossible for people to think of every sound they utter, as it would be intolerable to have to concentrate the mind upon every movement of the organs. No doubt it does require some mental effort and conscious action, but if it leads to the desired result, surely it cannot be denied that the effort is well spent.

The movements in normal speech are apparently unconscious, everything works smoothly, and we never give a thought to the varied and complicated actions that have been carried out. When, however, all this is irregular, and some disorder is present, speech, which in the ordinary subject is so simple, has to be taught, and every movement analysed. The speech in such circumstances must, to a large extent, be conscious speech, where the mind is actively engaged, and thus the irregularity is gradually overcome by the *natural* superseding the *unnatural*. It is astonishing how Nature will advance and reinforce the patient's efforts when once he begins to make real progress by his own effort and knowledge.

The speech thus gradually assumes the unconscious character, and this effort of the mind, which was indispensable in the early treatment, is no longer necessary. Thus it must be concluded that the way to unconscious or natural speech is by the conscious road.

A question frequently put is can all stammering people be made to speak naturally. The answer is "No!" as we find stammering allied with nervous disease to such an extent as to render it quite impossible to relieve. Then, again, where the patient is in other respects eligible, but there is a want of concentration and application, failure must result, just as it would in teaching any other subject. Although schoolmasters and doctors are not held responsible for failure where they can show that proper attention and skill have been expended, it is a matter of common knowledge that parents expect complete success to attend the treatment of their children suffering from some disorder of speech, and view failure as a want of skill on the part of the operator, regardless of the circumstances. They feel that sending the child and paying the fees must ensure good speech, and very often will do nothing to help towards this end. To tell them that the case presents special difficulties by reason of the nervous condition of the child, and that some considerable time will be necessary before any result can be expected, more often than not means that the case is withdrawn, and you lose it altogether. If on the other hand, the matter is made light of, and an early improvement predicted, the case is secured. Surely this kind of thing places a premium upon deception, and deception it is of the basest kind, but the main thing has been achieved, the work has been obtained.

As a general rule it may be laid down that the most favourable age for the treatment of stammering is between 8 and 13 years of age, just before the child goes to the secondary school. Of course it can be treated with success after this period, say up to the age of 25. After that age it becomes a matter of greater difficulty, but still can be attempted with varying hopes of success. As to the proportion that can be absolutely relieved of the difficulty it would probably amount to about 75 per cent. of those who might fairly be placed in the category of "eligibles." The reckless statement that all cases are curable is opposed to practical experience, and therefore strongly to be deprecated, as it not only leads to disappointment in these special cases, but effectually deters many from placing themselves under treatment who would have every chance of deriving benefit.

Stuttering.—This form of disorder is far more rare than stammering, but is often confused with it. There is, however, a marked difference, although both irregularities are to be

referred to the want of co-ordination of the expiratory muscles and, in a lesser degree, the inspiratory muscles. Whereas in the case of stammering we find there is spasmodic action, resulting either in the breath being totally suspended, or such relaxation that there is an inability to deal with the uprush of breath, in the phenomenon of stuttering the stops are after the first vowel sound, even the first syllable, and this movement is rapidly and frequently repeated, and thus you would get the sentence, "Charlie took Francis out to tea on Monday," rendered by a stutterer somewhat in this fashion: Cher-Cher-Cher-Charlie too-too-took Frer-Frer-Fra—ncis out too-too-too tea on Mu-Mu-Mu-Monday. The stammerer, however, might produce something like the following in dealing with the same sentence: Ch—arlie t—ook Francis out t—o tea on M—onday. Here there is a clear indication of want of promptitude in the production of the vocal element in the first syllable. It must be remembered that the sentence would not always be repeated in the same way, as what appears impossible at one moment is comparatively or quite easy the next, so the above can only be taken as an illustration of what might happen. From the example it will be realised that in stuttering the vocal element is not the difficulty, but that owing to the want of mental direction there is a lack of ability to proceed beyond the first movement until several attempts have been made. All this surely goes to prove that the mind is acting in advance of every modification of the organs necessary for fluent speech, and where there is an absence of this at the beginning, it cannot be expected that the modifications will take place in the rapid way required, and the sounds dovetailed in the natural manner.

Von Meyer in his work "The Organs of Speech" says: "In stuttering the process of breathing is quite normal, and the defective speech only arises from inaptitude in the formation of sound." This appears to be a most extraordinary conclusion to come to, and utterly at variance with the experience of the writer. There is no inaptitude in the formation of sound, as the stutterer always produces sound from the start.

There are cases where stuttering is allied with stammering, but they are exceedingly uncommon, and scarcely worth taking into consideration.

In the treatment of stuttering you follow closely upon the lines laid down for dealing

with stammering, the main and most important being the direction of the breath during speech, attention being drawn to the various elements contained in the word, and some instruction in phonetics. The language is notoriously unphonetic, and therefore written representation of the words as they are formed by the organs of speech will be found of great value. This also applies to stammering patients.

Lalling.—This is a Scotch term to denote that form of defective speech which is confined to the articulative oral mechanism, and is due to a want of precision in the action of the articulating organs.

The cause is undoubtedly referable to the brain, and not to carelessness. There are many cases of this kind, and in some there appears to be a power of doing the ordinary things of life without attracting attention, but it is not so with the majority. The brain is dull and incapable of great and sustained effort, and there is no doubt that the speech centres are affected, and require education.

Every sound must be dealt with individually and in combination, and manipulation must be resorted to. The great difficulty is where sounds are blended like "ch" (t and sh), and such double sounds as "tl" in "little." The muscles of the tongue and lips will be found undeveloped and out of control, and exercises to improve the muscular tone of these organs must be arranged and practised daily for some months.

The following words were taken down from a lalling patient of 19 years of age (female):—Parliament (pronounced paermunk), passed (pak), act (ak), consent (knghngk), hermit (hermi). It will be noticed that here there is an absence of the final explosive in some cases, and in others the back of the tongue is used for the front. Considerable difficulty is experienced in the rapid action required for the double finals, e.g., ps, ts, ks, in such words as taps, cats, and works; and still greater in the trebles, in such examples as wasps, posts, and tasks. However, with perseverance and regular and graduated work there is every hope of the speech becoming quite good and useful, provided it is not left until an advanced period of life, say, 25 years, when the chances of success are considerably reduced.

Cleft Palate.—Here we have a congenital organic defect which after operation, requires attention in the matter of speech. Everything depends upon the condition of the soft palate,

as without the power of action in this organ, nothing can possibly be done to improve the speech.

Many persons are under the impression that after the operation the child will speak in the ordinary way. This is a fallacy, as it is evident that the muscles of the tongue and lips, which have always been wholly inactive, must be undeveloped, and require a considerable amount of exercise. The cavity of the mouth has up to that time had very little share, and never an undivided share, in the passage of the breath during speech, owing to the physical condition of the patient. The soft palate, if capable of elevation, must be worked to that end, and manipulation of the nostrils by the finger and thumb must be judiciously resorted to. In this connection it will be interesting to quote from Gray's "Anatomy," p. 227:—"Sir W. Fergusson has shown that in the congenital deficiency called Cleft Palate the edges of the fissure are forcibly separated by the action of the *Lavatores Palati* and *Palato-Pharyngei* muscles, producing very considerable impediment to the healing process after the performance of the operation for uniting their margins by adhesion; he has consequently recommended the division of these muscles as one of the most important steps in the operation."

This is, there can be little doubt, a true statement of what obtained at that period, showing that the primary cause for the operation was the only thing considered, as it need scarcely be pointed out that the severance of these muscles would render the soft palate absolutely useless for purposes of speech. People often discuss the question of medical and surgical progress, and here they may find comfort in the fact that such a thing as this does not obtain in the present day—or at any rate has not come under the observation of the writer. Labial sounds are more easy of accomplishment than lingual, so the first part of the time is devoted to these, the latter being left to a later stage. Success depends upon the continuity of the work, and the time occupied in the process of developing sound; the acquisition of useful speech generally varying from three to nine months, according to circumstances. Even after this period the mother, governess, or nurse should continue the exercises daily for at least a year, when very good results may be expected.

Spastic Aphonia.—This is a painful form of disorder, and is entirely due to a spastic action of the expiratory muscles, complicated by the

same difficulty in the laryngeal muscles. In commencing a sentence the first word or two may be full, but from that point there is a gradual attenuation of the vocal movement until absolute silence prevails, the straining of the muscles increasing in intensity, and being very exhausting to the patient. Here we have an object lesson in *Force v. Science*, and the natural result. The origin of this distressing phenomenon is not easily traced, but it is the opinion of those competent to judge that it generally commences when there is a diminution in bodily vigour, and when loud talking or shouting in the open air forms part of the daily work. There is probably some difficulty experienced in making the voice heard owing to the weak condition of health, and then more energy is employed, with results less and less favourable in proportion to the increased muscular activity, until at last spastic conditions present themselves. In the case of women it is not uncommon to find it accompanied by hysteria. When such is the case a very firm and determined attitude must be adopted. Sympathy is ill-timed and utterly out of place and will most assuredly result in floods of tears; work being over for that day. Encouragement must, of course, be given by applauding sustained effort, and no sign of fatigue or disappointment must be witnessed by the patient. It is a weary business, and often no improvement of any kind is observable in a couple of months, although a month after that the patient may be entirely freed from the tyranny. Just as in cases of other nervous speech affections there is no regular progress. One day is very favourable, the next hopeless, and the third better or worse, it is impossible to predict the course; so much depends upon the health and general circumstances of the moment. "Nothing succeeds like success" has a special application in cases of this kind.

The method of proceeding is first to induce full and easy expiration with the glottis freely dilated. After that you deal with the simple vowels preceded by the aspirate. Watch very closely the junction of the voice with the breath, as here is the seat of your difficulty. It should be smooth, and the dovetailing perfect, if not there must be a certain amount of spastic action. After this you may proceed to the ordinary continuous non-vocal initials, such as "h," "f," "th," "sh," and "s," taking the less tense vowel sounds, as, for example, *a*, *ā*, *ou*, *ō*, *i*, and *oi*, and working them together all the time, and watching closely where the breath and

voice join. In this way you gradually proceed to those sounds that induce spastic action, and with your careful and well-chosen introduction you find less difficulty than you expected. This work must be carried on without intermission week after week, and month after month, for a period of from two to four months, the patient's general health in the meantime being a subject of some solicitude. Here we must bring the subject to a close with the remark that it is extremely difficult to deal adequately with such an important matter as this in the limits of a short article, and therefore the writer must make his apologies for the scanty nature of the information conveyed to readers, but hopes that what has been written will prove of some interest and profit to those who take the trouble to peruse it.

OBSTRUCTING REMOVAL TO ISOLATION HOSPITAL.—A case of obstructing an order issued by the public health authority by refusing to allow a child suffering from scarlet fever to be removed to an isolation hospital occupied the attention of the Lanchester Bench on 11th September. The defendant was Elizabeth Ward, of Allandale Cottages, Edmondsley, and the patient a seven-year-old grandchild whom the defendant had brought up from infancy. It was stated that the hospital ambulance called at the house on four occasions, but each time the woman declined to allow the child to be taken, despite the fact that an order, signed by a magistrate, was presented on one occasion, and also that the child's father had consented to the removal. The defence was that there was sufficient accommodation at the house. Dr. Buckham, the medical officer of health for the district, informed the Bench, however, that there were only four rooms in the house, and seven persons besides the patient were living there at the time. A fine of 2s. 6d. and costs was imposed.

DIRT AND DIARRHŒA.—"I am almost forced to the conclusion that the excessive diarrhœa death-rate of Barnsley is due to fleas and dirt; privy ashpits, accumulations of manure, and the rather dirty habits of a certain section of the population. . . . Some houses in Barnsley, one must conclude, are rendered unfit for human habitation by reason of the personal lack of cleanliness on the part of the tenants. It is difficult otherwise to explain why a place like Brighouse, with a population of 21,000—a third of that of Barnsley—should only have had three deaths from diarrhœal causes during 1913, whereas Barnsley had 65."—*Dr. F. J. Sadler, Medical Officer of Health, Barnsley, Annual Report, 1913.*

SOME ASPECTS OF THE PROBLEM OF FOOD INSPECTION WHERE TROOPS ARE CONCERNED.

FROM A CORRESPONDENT.

THE enormous development which has taken place since the outbreak of war in the task of supplying our army with food will strike all who are familiar with questions relating to the public health control of food supplies as being a matter which must call for exceptional watchfulness and care on the part of those engaged in the work of food inspection. Especially will this be so when our experiences in this respect in previous wars are recalled, when the problem was a simpler one and much less important issues were at stake.

Contracts for the supply of food materials for the army have been entered into by many firms in various parts of the country. Apart altogether from any desire which an unscrupulous trader here and there may have to increase his profits by using inferior or objectionable materials, or by neglecting to observe proper sanitary precautions in preparing his products, the pressure under which much of the work is being carried out by contractors, must tend to slacken the control which in normal times would be exercised by them. These circumstances affect not only the food materials prepared for army contracts, but are bound also to have an influence on food prepared in contractors' factories for sale in the ordinary way to the general public. It is therefore a matter of something more than ordinary importance that special attention should be paid by officers of sanitary authorities to any food-preparing places in their districts which are engaged in work of this kind.

An arrangement was arrived at between the War Office and the Local Government Board shortly after war was declared, which enabled the latter department, through its inspectors of foods, to arrange with the medical officers of health of the districts concerned for special inspection of the materials used and processes employed at factories in different parts of the country at which War Office contracts were being carried out. As a result much valuable work has already been done, and is still being done, by medical officers of health and the staffs of food inspectors at those places. The embodiment of the new armies has meanwhile enormously extended the problem of the food supply of our troops and has

necessitated a certain amount of decentralisation in supply arrangements. In a number of the new camps arrangements for food supplies are now being made locally with contractors who may, or may not have their main food-preparing premises in the vicinity of the camp for which they cater. It should be the aim to secure expert control by properly appointed officers over the products of these firms in course of their preparation—the only point at which a really adequate control can be exercised in many cases. Take, for example meat supplied under contracts of this kind. Meat as delivered at a camp, in quarters or joints, can, generally speaking, only be judged as to its freshness and general appearance. It is at best a difficult matter, requiring very considerable expert knowledge to discover at this stage any diseased condition which may have affected the meat. This can only be done satisfactorily at the slaughter-house during the dressing of the carcase. These considerations apply of course with even greater force to products such as sausages, meat pies, etc. No inspection on delivery at a camp can be a sufficient safeguard against the preparation of such materials under dangerously insanitary conditions, or from diseased meat. From this it will be obvious that where foods are delivered in a more or less prepared condition at camps such inspection as can then be made will at best have but a limited utility. It is here that most valuable help can be given by the expert sanitary staffs of the local authorities in whose districts such food-preparing places are situated. As already indicated, not only the troops in some more or less distant camp, but also the general public of the district may be affected by unfavourable conditions prevailing in work places where food materials are being produced, perhaps under considerable pressure. In these circumstances, where it is known that food preparation of this kind is being carried out in any district, the sanitary staff should make it their business to give special attention to the inspection of such places, and where necessary should enforce to the full their powers in regard to the wholesomeness of the materials employed and the sanitary conditions of the premises on which the work is conducted.

No doubt in time it will be possible for the inspectors of foods at the Local Government Board to supplement the information which they have already supplied to medical officers of health regarding those food manufacturers

dealing directly with the War Office, by similar information concerning firms engaged in local contracts with the various camps. In the meantime much valuable service could be rendered by medical officers of health in this matter (1) if medical officers of health of districts in military occupation (who are believed already to be taking steps to ascertain in what direction co-operation can be established between civil and military sanitary authorities) were to ascertain whether part of the food supply of the troops is coming from food-preparing places within their district and arrange for the special supervision of such places; (2) if the medical officer of health of any district in which foods are known to be prepared on a large scale for the supply of troops were to make special arrangements for inspection of these establishments; (3) if any information of unsound or doubtful food prepared in such places coming into his possession were communicated to the Local Government Board's inspectors of foods.

APPOINTMENTS.

DR. WM. ANDERSON, of Shenfield, has been appointed by the Billericay Rural District Council medical officer of health and medical officer at the isolation hospital during the absence of Dr. J. D. Wells, now on active service.

DEPUTY SURGEON-GENERAL O. W. ANDREWS, R.N., medical officer of health of Gloucester R.D.C., has been appointed to Portsmouth Dockyard.

DR. GRACE GIFFEN DUNDAS, wife of the medical officer of health of Ramsgate, has been appointed to act as medical officer of health and school medical officer during her husband's absence on active service with the Territorials.

DR. C. R. DYKES, of Buckhurst Hill, has been appointed medical officer of health by the Loughton District Council, in the absence of Dr. Butler Harris, on active service. Dr. Harris has held the post of Captain of the local company of the 4th Battalion Essex Regt. for a number of years.

DR. SYDNEY HUNT, of Spondon, has been appointed medical officer of health to the Shardlow R.D.C.

DR. EDWARD LEWIS, of Anglesey, has been appointed medical officer of the County of Glamorgan under the Mental Deficiency Act.

DR. D. J. THOMAS, medical officer of health, of Acton, and DR. ELSIE M. CRUBB, assistant medical officer of health, have been appointed certifying officers for the district under the Mental Deficiency Act.

PRISONER OF WAR.—DR. C. J. Thomas, an assistant medical officer in the Public Health Department of the London County Council, is detained as a prisoner of war in Hamburg.

THE ANNUAL REPORT OF THE CHIEF INSPECTOR OF FACTORIES AND WORKSHOPS FOR THE YEAR 1913.

By WALTER CHALONER RIGBY, M.B., Ch.B., D.P.H.,
Medical Officer of Health, Certifying Factory Surgeon.
Adlington, Chorley, Lancashire.

THE report for 1913 of the chief inspector of factories, which has just been published, is both interesting and instructive alike to sanitary authorities and public health officials generally.

Brought out in the form of a Blue Book, it consists of a comprehensive divisional report by the senior superintending inspector in conjunction with the inspector for dangerous trades, reports of the medical, principal lady, and electrical inspectors, together with a series of 23 comparative tables illustrating the work of the Department for the year 1913 and previous years.

In a short general report by the chief inspector himself (Sir Arthur Whitelegge) we are told that there was no important legislation concerning the Factory Department in 1913, but that several orders under the Factory Acts were made, among which may be noted new conditions to be attached to all night work of boys, namely, periodical medical examination and certificate from the district inspector that the arrangements for the compliance with the requirements are satisfactory in reverberatory and regenerative furnaces and for galvanizing works; regulations for the manufacture and decoration of pottery, for the better compliance of which a special exhibition of the best methods was made by the joint committee of the pottery masters of Great Britain; regulations for the manufacture of chromate and bi-chromate of potassium and sodium, while, on the other hand, after a public inquiry, the draft regulations for the manufacture of patent fuel (briquettes) were withdrawn.

A committee was constituted in 1913 to inquire and report "as to the conditions necessary for the adequate and suitable lighting (natural and artificial) of factories and workshops, having regard to the nature of the work carried on; the protection of the eyesight of the persons employed and the various forms of illumination."

Annual reports were received from 2,321 medical officers of health, and the statistical data so far as they related to factories, workshops, and home-work are summarised in a special table.

Statistics taken from Table 23 indicate that 300,000 works were under inspection, including 120,000 factories and 154,000 workshops, in addition to the docks, wharves, and quays and buildings under construction, showing an increase of nearly 13,000 factories, but a decrease of nearly 2,000 workshops compared with 1912. The number employed is given as 4,488,774 persons in factories and to 638,335 in workshops.

Some 425,000 visits of inspection were made, resulting in 200,000 cautionary notices. Prosecutions were instituted in 3,872 instances, against 2,674 in 1912, and as regards accidents fatalities increased from 1,260 to 1,309, and other accidents from 154,972 to 176,852. Lastly, a central museum of safety appliances is being erected in London, to contain exhibits of approved appliances for the prevention of industrial accidents and disease both in mining and in processes under the Factory Acts. Further, an effort is being made to extend this scheme and to make use of the machinery and appliances of the technical schools of Lancashire as a permanent exhibition of adequate fencing and safeguards generally.

Divisional Report.—The divisional report (with which may be incorporated for the purposes of this review the principal lady inspector's report dealing on similar lines with employment associated more particularly with female labour) contains much valuable information collected from all over the United Kingdom, and is summarised under the following headings:—(1) Organisation and scope of work; (2) industrial developments and changes; (3) complaints (lady inspectors' report); (4) sanitation; (5) safety, accidents, fencing; (6) dangerous trades; (7) employment and hours of labour; (8) sanitary authorities and home work; (9) particulars as to pieceworkers; (10) truck.

Sanitation.—Under this head we are told that there is a gradual rising standard of cleanliness in the larger and newer buildings, especially those appertaining to the manufacture of foods, where it is not uncommon to find daily cleansing after work, baths, washing-places, changing-rooms, clothes-cupboards, and meal-rooms.

The chief causes of complaint appear to be dirty shop floors and unsuitable premises, especially basements, for the processes carried on in them. Closely akin to cleanliness is the *drainage* of floors in factories where a wet process is carried on, as in laundries, etc., where complaints are made of badly constructed cement floors without a proper fall, leaving in time wet potholes to the detriment of the workers. Active propaganda by medical officers of health and inspectors in all parts of the country are being directed to improve these conditions. In *bakehouses* the standard of cleanliness is reported to vary in different parts of the country. While there is no fault to be found with a good modern bakehouse, too many of the old and badly constructed ones still remain in use.

With respect to the *sanitary conveniences* a high standard of efficiency is maintained in London, and the larger municipalities where the law is actively pressed, want of cleanliness resulting from misuse being the only real trouble; but in some districts the conversions to w.c.'s are

comparatively slow, and in the lady inspectors' report great complaints are made that in the N.W. division the outstanding defect is the sanitary accommodation provided for women.

These are matters which require the prompt attention of all local sanitary authorities, some of whom are somewhat backward in promoting the conversion of pan and privy middens to the water carriage system on account of the expense involved.

The sections dealing with *shuttle hissing* and *humidified sheds* in cotton-cloth factories tell us that as yet no satisfactory shuttle has been evolved, and that of the three systems of humidifying, viz. (1) steam jets, (2) steam and air by diffusion ducts, and (3) atomised water; the latter is the best and the one generally installed in new sheds, concerning which it is desirable to submit plans to the Department for approval.

Ventilation Temperature and Lighting.—As the subject of lighting is as yet outside the scope of the Factory Act, and is still under the consideration of a Special Committee, it is only necessary here to refer the reader to the facts given in the Chief Inspector's summary and to the large number of complaints which have been received.

The problem of the ventilation of workshops generally is regarded as much more important than the more detailed problems connected with workshops, which are subject to special regulations, such as the removal of fumes or dust by closely applied exhausts. Nevertheless, the application of mechanical ventilation to the general removal of impurities in clothing factories and laundries plays a large part in the general problem. The gradually increasing application of exhaust ventilation for the removal of impurities is leading, on the whole, to a far better standard of general ventilation than where reliance is placed solely on a natural system—an example of this is seen in the introduction of exhaust fans and properly constructed hoods in place of general ventilating fans in the card-rooms of cotton mills. Plenum ventilation is also adopted for reducing temperatures in over-heated weaving sheds. On the other hand, many complaints of cold work-rooms were received.

Safety, Accidents and Fencing.—Reports of accidents have increased in number during the past year by 14 per cent., in spite of improved fencing and safeguards. This in the opinion of the inspectors is due to (1) greater risks from increase trade activity; (2) better reporting; (3) absence of large industrial disputes.

First aid appliances are in use in most of the large works, and are being extended to the smaller ones under the attention in each case of a first-aid ambulance man. It appears to be the general opinion of certifying surgeons that blood

poisoning is better prevented by the use of dry antiseptic dressings than when the wound is washed in water or in so-called antiseptic lotions.

There are many varieties of fencing and safeguards used in connection with moving machinery which should be standardised and should be supplied with the machines themselves. Unfortunately they are often considered a nuisance by the workman, who, when their use is not enforced, discards them altogether. To prevent this, to reduce the number of accidents, large firms both here and in America are appointing what are called Safety Committees and Inspectors of Hygiene with the result that in the case of one American firm there has been a reduction in fatal and serious accidents of 43 per cent.

Explosions.—Reports of certain dust explosions have led to further experiments at the Home Office Experimental Station in Cumberland with regard to the inflammability of carbonaceous dusts and their capacity for transmitting explosions. These have so far resulted in the placing of Syrolit (a mixture of milk curd and formaldehyde used as a substitute for celluloid in the manufacture of combs) and Distillery Meal in Class I as dangerous dusts and the dust of myrabolium and Valonia Nuts in Class II as inflammable, but not dangerous. Further enquiries into the causes of these explosions seem to confirm the opinion previously formed that "collections of dust in dust chambers connected to exhaust fans or when mixed with air in a confined space are explosive on coming in contact with a flame, and that more modern methods of intercepting the dust such as a cyclone collector or bag filter should be substituted in the former."

Oil Explosions in the crank chambers of high-speed engines appear to be due to a fine spray of oil vapour resulting from constant agitation of the oil, the remedy for which is the removal of the vapour by plenum ventilation.

Other explosions have disclosed a lack of necessary safety appliances.

Means of Escape in Case of Fire.—The constant attention of inspectors is frequently called to such points as blocked passages, locked exit doors, windows, and absence of fire drills, etc.; a most important point which affects a large percentage of the cotton mills of Lancashire where outside fire escapes have been erected to comply with the bye-laws of the sanitary authorities is that the landings of these would probably be more or less blocked in time of need.

Dangerous Trades. The number of works under regulations and special rules at the end of the year was 68,432.

Elaborate arrangements have been made in the pottery trade to comply with the new code of regulations previously mentioned, and have

resulted in a fall from 80 to 62 cases of reported lead poisoning. In almost all the other dangerous trades favourable reports are sent in regarding the observance of regulations, irregularities being chiefly in connection with the proper maintenance of the exhaust fans, and it is satisfactory to hear that the operatives themselves begin to appreciate more fully the efforts made for their health and comfort, instead of resenting them as an interference with the liberty of the subject.

Employment.—An interesting result of the proper regulation and reduction of hours in the fish curing industry has been an increased output of 25 per cent. over all previous records.

Time cribbing has had to be severely dealt with and is the highest on record.

As regards child labour, which is very prevalent in textile districts, considerable benefit has resulted from co-operation between the school medical officer and the certifying surgeon in the examination of children suspected to be defective, and in cases of pediculosis capitis (also I might add from co-operation between the Juvenile Labour Exchanges, and the certifying surgeon in the case of rejected children and young persons, and from the granting of conditional certificates of employment).

Sanitary Authorities and Home Work.—Apparently the keeping of prescribed lists of outworkers is not enforced by some authorities as it should be, and on the other hand beneficial results have followed the issuing of a notice to outworkers regarding unwholesome premises.

Electrical Inspectors' Report.—This report comments upon the increased use of electricity as a motive power and deals in a technical manner with the various accidents and safeguards electric stations, sub-stations, and factories, other than stations, and with irregularities connected therewith.

Report of the Medical Inspector.—Considerable interest attaches to the report of the medical inspectors, which summarises and compares with other years the salient points incidental to industrial poisoning and other dangers to the health of the workers. We note that inquiry was undertaken for the purpose of discovering whether the high wet-bulb temperatures which prevail in many wet spinning-rooms and humid weaving-sheds at the flax and linen industry have the same effects of discomfort and ill-health upon the operatives as those alleged in cotton weaving sheds, and the definite statement is made that "a rise in the mouth temperature is apparent (much more noticeable in women than men) when the temperature of the wet bulb exceeds 75 deg. F.; in other words, that weavers are likely to be when this is the case, working under adverse physiological conditions." A Departmental Committee recommended

exclusion of cow-pox and Dupuytren's contraction and inclusion of miners' nystagmus and writers' cramp to the Third Schedule of the Workmen's Compensation Act, 1906.

A Departmental Committee was appointed to inquire into the dangers from infection by anthrax in the processes of sorting, willeying, washing, combing, and carding wool, goat hair, and camel hair, and in the processes incidental thereto, and to consider and report whether any and, if so, what amendments are desirable in the regulations for these processes made under sec. 79, 1901.

Experimental research on factors affecting efficiency of work or fatigue (by Prof. Kent of Bristol) in a letterpress printing works appear to show that fatigue on a Friday is definite. Special inquiries were made by Dr. Collis into various industrial diseases, amongst others, dust inhalation and respiratory diseases, an unusual cough amongst weavers, ulcers on the hands of fish curers, prevalence of lead poisoning in the hollow-ware industry, in the heading of yarn, and in the manufacture of tarpaulins.

Lead Poisoning.—The figures for 1913 compare favourably with those of any preceding year except 1910, whereas the increase in the reported number of deaths since 1906, which has given rise to some comment, is attributed by the chief medical inspector to the greater inclination on the part of medical practitioners—since the Workmen's Compensation Act, 1906—to associate the occupation with the chronic nephritis and cardiac failure, which so frequently appear on the death certificates of lead workers. All these cases are included in the figures.

The following table of deaths supports this view:—

1900.	1901.	1902.	1903.	1904.	1905.
114.	101	83	90	87	78
1906.	1907.	1908.	1909.	1910.	1911.
74	92	105	91	86	110

Of the 27 deaths noted in the returns no single one was due to acute lead poisoning, as compared with six in 1899, and three in 1900. They are practically all certified as due to chronic interstitial nephritis or cerebral hæmorrhage set up by chronic nephritis.

The figures for the *smelting of metals* show the largest reduction, and it was in this industry that the Workmen's Compensation Act revealed most prominently unrecognised plumbism, and the quarterly medical examination has shown that a large proportion of the workers remain in the industry all their lives. The number of cases amongst chandelier fitters, in consequence of the substitution of "caulkite" for white lead paste as a jointing material, and the pump and pressure gauge for testing in place of suction by the mouth, have diminished.

The total number of cases in plumbing and soldering remains stationary. Examination of the workers showed the risk that was run from volatilisation of the lead fumes and the consequent necessity for insisting upon locally applied exhaust ventilation. This latter, with periodical medical examination, has been responsible for a marked reduction in the number of cases in the hollow-ware branch of tinning, china, and earthenware, and the other processes in which lead poisoning may occur. On the other hand, the frequent handling and a disregard of the regulations has been followed by an increase in electric accumulators.

Arsenic Poisoning.—Six cases were reported: two from sheep dip, one in the extraction of arsenic, one in bronzing, and two from chemical works. The automatic methods adopted in the manufacture of emerald green, which dispensed with any handling of dusty materials, have resulted in there being no cases now from this cause, though between 1900 and 1913 46 out of 86 cases were due to it alone.

Mercurial Poisoning.—Of 14 cases reported four were set up by dust of fulminate of mercury, three in the manufacture of mercury compounds, such as calomel and corrosive sublimate, three in (a) planking, (b) forming, and (c) cutting waste of felt hat manufacture, two in the making of thermometers and barometers, one each in making electric meters and mercury vapour lamps.

The remedies advised in the latter were:—(1) Inclined floors and channel to a receptacle; (2) exhaust ventilation at the floor level, owing to the heaviness of the mercury vapour; (3) periodical medical examination for early detection of symptoms and temporary transfer to other work.

Anthrax.—Seventy cases, including seven deaths, were reported. This is the highest number yet recorded, and the increase is due to the extra number of cases where the disease has been contracted from wool. It is interesting to observe that salvarsan has experimentally been found to kill anthrax in animals, and that three cases of successful treatment in man are recorded; also that, as a result of careful tests, it has been found impracticable to use steam as a disinfecting agent for wool from the bale, except for such blood-stained material as is removed in preliminary sorting. During the year 933 samples tested for anthrax spores showed them present in 111, and out of one single bale of Cape-skin mohair 42 bloodstained samples (out of 78 examined) were found to contain anthrax spores. The high proportion was due to the experiment having been undertaken for special objects.

Fumes and Gases.—Ninety-four cases of poisoning by gases and fumes were reported, a much lower figure than in the two previous years, due to a marked reduction in the number of cases from

carbon monoxide, from nitro- and amido-derivatives of benzene, and to the absence of a single case from nitrous fumes.

Regarding the withdrawal of the draft regulations for the manufacture of patent fuel, in which pitch ulceration occurs, owing to the refusal of the men to use the baths and washing materials which were provided, because of the severe pain experienced in the face and eyes on going into the fresh air, an experiment is being tried of treating tar with formaldehyde, to see whether pitch from tar so treated has less effect on the skin than ordinary pitch.

As regards the result of the regulations in force in the manufacture of chromate and bi-chromate of potassium and sodium there is a diminution of chromo-ulceration on the hands, due to the immediate supervision of the certifying surgeon (under Rule 10) and transfer to other work; but apparently there is as yet no effective way of preventing perforation of the septum of the nose.

The very interesting accounts of Dr. Collis's investigation and reports on *dermatitis*, including eczema from mineral oils, chrome dermatitis in tanning, and salt ulcers in herring curing (all preventable by the use of a carbolised ointment and free washing), weavers' cough (from inhalation of mildew spores) will be read with great advantage in the full report, but cannot be referred to here in detail.

I will conclude this brief review by summarising the conclusions Dr. Collis has come to regarding the "effects of dust in producing diseases of the lungs," namely, "inhalation of mineral dusts which contain free silica is associated with an excess of phthisis, an excess which bears a direct relation to the amount of free silica present." In general dusts appear to be more injurious, as their chemical composition differs from that of the human body or from the elements of which the body is normally composed.

SCHOOLS FOR MOTHERS.—"It may be asked, what good is the Mothers' Club doing? After two years' experience I have no hesitation in saying that it is doing a very considerable amount of good, and its influence is perhaps more far-reaching than that of any other agency. Everybody is agreed that there is a crying need for the education of the people in the laws of healthy living, and many suggestions for securing this have been put forth, e.g., the teaching of hygiene in the schools, public lectures, and so on, but none of these are, in my opinion, so efficient and practical as a school for mothers. The teaching of hygiene in schools is good, but much of it is soon forgotten. Public health lectures are good, but the people who are most in need of such lectures do not attend."—Dr. Thomas Gibson, *Medical Officer of Health, City of Wakefield, Annual Report, 1913.*

EPIDEMIC DUE TO INFECTED MILK.

AN epidemic of sickness and diarrhoea which recently affected the whole of the Brinscall district, near Blackburn, was inquired into at an inquest held on September 9th last on John Riding and Eric Backhouse, who succumbed.

In the course of the inquiry relatives of the deceased stated that the latter had suffered from diarrhoea after consuming milk. Other witnesses also deposed to having been attacked with violent sickness and diarrhoea after taking milk, which it was shown was in every instance derived from a farm in the neighbourhood.

DR. MACLEAN, medical officer of health, Withnell, said that out of the 114 houses served with milk by this farm 77 had been affected with the epidemic. Of the remaining 37 served 20 had had no milk on the date in question, Sunday morning, July 12th. The other 17 had either been away for the day or had only had very small quantities of milk. Altogether there had been 172 affected. In his opinion the whole of the infection came from the Sunday morning's milk. On Tuesday he found that a cow had died at the farm. The owner told him that it had been ill for ten days before death. The owner had, personally, twice a day "stripped" the cow of what milk it gave, and the milk was always allowed to remain on the floor of the shippin and drain away. It was never put into vessels of any kind. By her hand coming in contact with the cow that was ill and then with another cow it might possibly carry infection.

Inquiries after the death of the cow on behalf of the county medical officer (Dr. Sargeant) showed that the farm was exceedingly well kept and clean.

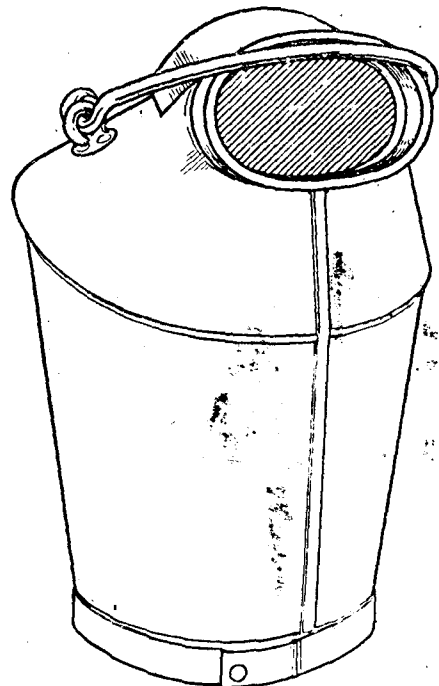
PROFESSOR DELEPINE, Director of Public Health in the Laboratory of the University of Manchester, and Professor of Public Health and Bacteriology in the same University, said he had received portions of the bodies of John Riding and Eric Backhouse, and parts of the hide of a red cow. He had received a sample of the milk of Tuesday, July 14th, but had obtained no results. A certain bacillus had been in the blood and organs of the ailing cow. The bacilli multiplied very rapidly. It was quite easy to prove that a small amount of milk obtained from the cow would affect a very large amount of milk. A few drops would affect several gallons. If the milk had been refrigerated at once little harm would have been done with it.

The CORONER said there seem to be no dispute as to the cow having set up the infection which had brought about the illness and deaths of the two people. Gastro-enteritis caused through infected milk had been the cause of the deaths. The farm was in good condition, with a well-groomed and healthy stock.

A verdict of "Death from gastro-enteritis, due to infected milk," was returned.

CLEAN MILK.

THE following interesting notice, signed by Dr. John Robertson, Medical Officer of Health of Birmingham, and Mr. John Malcolm, the Veterinary Superintendent, has been issued



to farmers by the Birmingham Public Health Committee:—

COUNCIL HOUSE,
BIRMINGHAM,
July, 1914.

CLEAN MILK.

The Public Health and Housing Committee of Birmingham desire to draw the attention of farmers and others supplying milk to Birmingham to the necessity of taking care to ensure that the milk which they supply is free from contamination with cow-dung and other foul matters found in cowsheds and their precincts.

A high degree of cleanliness has been attained in many American cities by methods which are very simple and do not add greatly to the cost of production.

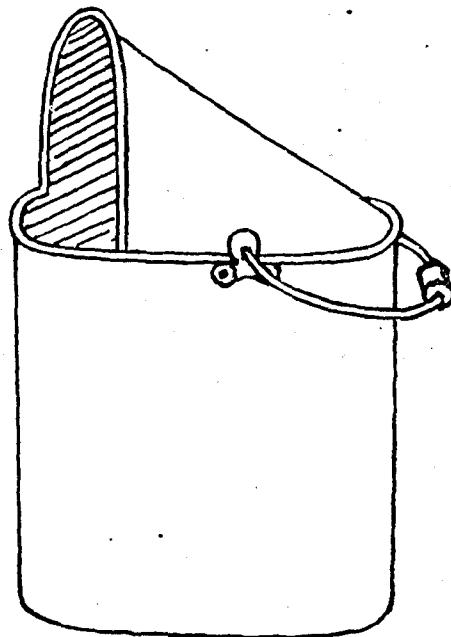
Bacteriological experiments have been made recently in Birmingham at four good dairy farms, and the results are printed below.

Number of germs in 1 cubic centimetre (about a teaspoonful) of milk samples taken by ordinary milking methods, and by special milking methods.

	Ordinary Method.	Average	Special Method.	Average	
After 2 hours	Farm A - 6,700 Farm B - 10,600 Farm C - 147,500 Farm D - 360	41,312	150 400 140 247	234	
After 24 hours	Farm A - 9,200 Farm B - 5,800,000 Farm C - 852,000 Farm D - 554,000	1,803,800	160 18,000 400 1,340	4,975	
After 48 hours	Farm A - 32,000,000 Farm B - 39,840,000 Farm C - 16,180,000 Farm D - 27,140,000	28,790,000	460,000 6,827,500 38,000 548,000	1,968,375	

In every case the special samples were still sweet when the ordinary samples were sour and clotted.

The Public Health and Housing Committee will be very glad to have tests made at your farm, with a view to ascertaining the efficiency of the methods, and the degree of cleanliness of your milk. An application to either of the undersigned will receive attention.



SUGGESTED METHOD OF MILKING TO SECURE GREATER CLEANLINESS OF THE MILK SUPPLY.

1. The cows and cowsheds to be kept clean.
2. All long hairs on udder and flank of cows to be kept short by clipping.
3. Cows' flanks to be damped with a damp brush, and their udders wiped clean with a wet cloth before milking, to prevent dust and dirt from falling into the milk.
4. Milkers to wash their hands with soap and water before milking and to wear clean overalls.
5. A covered milking pail to be used with an opening in the side.
6. The milk to be immediately removed from the cowshed into a clean dairy and passed through a strainer and cooled.

The most important items are the damping of the cows flanks, and the use of a pail with a side opening.

From experience elsewhere it may be said that there are from 50,000 to 100,000 germs in every teaspoonful of milk as it leaves the farm, while if the precautions mentioned above are taken the numbers should not exceed a few hundreds. The effect of this greater cleanliness is that the milk is much more wholesome for children, while its keeping qualities, particularly in hot weather, are very much better than in milk produced under ordinary conditions.

JOHN ROBERTSON, M.D.,
Medical Officer of Health.
JOHN MALCOLM, F.R.C.V.S.,
Veterinary Superintendent.

REVIEWS.

PROBLEMS OF SCHOOL HYGIENE. Edited by W. Leslie Mackenzie and L. D. Cruickshank. Wm. Hodge & Co., Edinburgh. 8vo., pp. 112, price 2s. 6d.

This book contains a record of the first Conference of the Scotch School Medical Officers, the keynote of which was synthesis and demonstration of the continuity of method of the whole education service from the hygienic training of teachers to the detailed inspection of children.

The conference emphasised the importance of close interchange of ideas between the administrative and the clinical sections, while from the fact of its organisation by the officers of the Scotch Education Department it served to bring the central department into relation with local officers, and so to spread a spirit of good understanding and co-operation. Special stress is laid on the value and importance of physical education when linked up with the school medical service.

Interesting sections deal with the medical examination of candidates for the teaching profession and for the physical training profession, though regrettably all the questions raised were not answered in the discussion. The section on school medical research should prove of use to all in need of subjects to investigate. Some speakers specially drew attention to the advantages which would accrue if some matters of routine, which take up much time to little obvious profit, such as the weighing and measuring of every child, were discontinued, or carried out at, say, five-yearly intervals, the time saved being devoted to other subjects of interest, any necessary weighing of individuals on clinical grounds being continued as before. In any case, uniformity of method is essential lest, as was pointed out, the school service be found guilty of the charge of collecting statistics inaccurately and using them stupidly.

BOY LIFE AND LABOUR. By Arnold Freeman. P. S. King & Son.

This is a study of a random sample of boys who fail to pass at the higher grades of labour, but escape the special temptations of street trading and casual employment. There is a detailed study of seventy-one boys who were in their seventeenth year, but had had four or more posts since leaving school. The author finds the real evil associated not so much with the straightforward "blind alley," and thus a problem of unemployment, as with the general level of efficiency and due to the lack of training and the manufacture of inefficiency in the majority of

boys between school and manhood. Various methods are suggested and discussed with detailed references and a full bibliography. The book should be in the hands of all who have to deal with the practical side of social economics.

MINIMUM RATES IN THE CHAIN-MAKING INDUSTRY. R. H. Tawney. Ratan Tata Foundation.

This is the first of a series of monographs in which the practical results of the policy of the minimum wage will be studied. In the beginning chain-making was dealt with as the first industry for which a Trade Board established minimum rates, and also as being concentrated in a small area it was easy to study. On the other hand, being as yet chiefly a handicraft carried on in small workshops or sheds attached to the workers' cottages, and unfaced by serious foreign competition, it is far from being a typical industry.

The results have been to lead to a rise in the piece rates paid, to increase the weekly earnings and the general standard of life of the district, while it does not appear to have led to unemployment or to any great introduction of machinery. The increased piece rates have been met partly by a rise in price and partly by reduced profits and the dropping out of inferior qualities. Owing to the atypical nature of the industry it is impossible to generalise from the results of this enquiry, but enough is shown to stimulate further research.

SCHOOL DENTAL NOTES.

IN the near future it is intended to publish a short article on the drawing-up of notices for school dental clinics. Though this is often thought an easy matter, a small error in diplomatic wording may cause endless trouble and interfere greatly with the attendance of children at a clinic.

A certain important education authority states in one of its notices to parents that the fee for complete treatment will be 1s., to be reduced to 1d. in necessitous cases. This alternative suggestion is responsible for endless trouble, as a large number who can quite well afford to pay 6d. are not allowed to pay more than 1d., a sum which is manifestly not worth the cost of collection.

The International Dental Congress, which started on August 3rd, and was to be held at the University of London and the Institute of Technology, South Kensington, was seriously affected by the mobilisation of European troops and ultimate declaration of war. No official representatives arrived from France, Germany,

Belgium, or Holland, though a good many non-official congressists arrived from Russia. Every effort was made to keep the Congress going, in spite of rumours that the Congress premises might be acquired for military use. On Thursday, August 6th, the meetings finally ceased, and it is gratifying to know that the last session to hold a meeting was that devoted to School Dental Hygiene, at which Dr. Potter, of Boston, and Mr. C. Edward Wallis spoke, the latter showing a large number of slides demonstrating the completeness of the L.C.C. dental inspection and treatment scheme for London.

It was manifest from what was said by the foreign delegates present that no capital city has so well thought out a scheme capable of indefinite expansion as that for the complete inspection and treatment of the elementary school children of London.

Though the Congress only lasted from Monday till Thursday, enough time was given to show how exceedingly well it had been organised—a welcome contrast to some which have taken place abroad.

A paper of considerable interest was contributed by the chief dentist of the Forsyth Dental Infirmary for Children, now being completed in Boston, Mass. It has been founded by two brothers named Forsyth in memory of two other brothers, and is expected to be open towards the end of 1914. It is intended to provide for the dental needs of the school population of Boston, which numbers 220,000 children. Apparently it will have no official status as part of the education or public health organisation of the city, and in this respect we feel that much of its usefulness must inevitably be impaired. No money is to be spared upon its equipment, decoration, and so forth; and, if the beneficial results are in any degree proportional to its vast cost, the founders will indeed have deserved the gratitude of the citizens of Boston, to say nothing of those of other cities to whom they have set so gigantic an example of dental philanthropy.

The war is seriously affecting the dental profession, as a large number of dentists, including school dentists, have been mobilised for war or foreign "service." None of them, we believe, has been engaged to undertake dental duties, some of them being on duty as members of the R.A.M.C., while others are engaged in the Army Service Corps Sanitary Companies.

Dr. HOLT, the medical officer of health of Burnley, has been called upon to serve with the Territorial Forces as a member of the R.A.M.C. Dr. Markham, the deputy medical officer, will act in his absence.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED 1888.

INCORPORATED 1892.

REPORT OF COUNCIL, SESSION 1913-14.

Your Council report:—

1. That they are again able to present a satisfactory report, dealing with the work of the past session, 1913-14. When the Society was incorporated in 1901 there were 387 Fellows, and there are now 1,117. The total membership of the Society is 1,175, and includes 23 Hon. Fellows, 1,117 Fellows, and 35 Associates. During the session under review, 16 Fellows have died and 41 Fellows and 1 Associate have resigned. There were newly elected during the session 74 Fellows, and 1 Associate.

2. That they regret to have to record the deaths of Dr. Francis Vacher, who was President of the Society in 1895-96; Dr. H. Franklin Parsons, President of the Home Counties Branch in 1911-2; and Drs. R. Musgrave Craven, E. F. W. Bywater, E. P. Evans, John Meredith, T. Danily Paddock, and Bertram Thornton.

3. That an address was delivered by the President, Dr. A. K. Chalmers, upon "A Page in the Natural History of Pulmonary Tuberculosis."

4. That at the meetings of the Society the following subjects were dealt with:—

(a) "Vaccination—Its Increasing Neglect in Recent Legislation," by Dr. W. M. C. Wanklyn.

(b) "The Sale of Milk," by Dr. Joseph Cates.

(c) "Problems of Rural Housing," by Drs. Andrew A. McWhan and W. G. Savage.

(d) "The Use of Refrigeration in the Preservation of Foods," by Dr. W. Hanna.

(e) "The Epidemiology of Phthisis," by Dr. A. S. M. Macgregor.

(f) "The Elimination of Cross Infection in Fever Hospitals," by Dr. B. A. I. Peters.

5. That the Annual Provincial Meeting was held on May 30th, 1914, at Glasgow, when a paper was read by Professor Matthew Hay on "Public Health Research," and Surgeon-General William C. Gorgas of the War Department, Washington, U.S.A., was elected an Hon. Fellow of the Society.

6. That they have elected the following officers for the Session 1914-15:—

President:—Dr. Herbert Jones, medical officer of health of Herefordshire C.S.D.

Hon. Secretaries:—Drs. Joseph Priestley and T. W. N. Barlow.

Hon. Treasurer:—Dr. Charles Sanders.

Hon. Editor:—Sir Shirley Murphy, F.R.C.S.

Hon. Librarian:—Dr. Wm. Butler.

Hon. Solicitor:—Mr. Robin Hamp.

7. That they have handed to Mrs. Manley, widow of the late Dr. Herbert Manley, the sum of £87 2s. 6d., being the amount subscribed by members of the Society to the Manley Fund.

8. That they have appointed delegates in connection with the following Congresses:—

(a) Victoria League Imperial Health Conference and Exhibition, London, 1914.

(b) Royal Sanitary Institute Congress, Blackpool, 1914.

(c) International Congress on Diseases of Occupation, Vienna, 1914.

(d) International Congress on Social Work and Service, London, 1915.

(e) 40th Annual Congress of the Incorporated Sanitary Association of Scotland, St. Andrews, 1914.

9. That they have communicated with the following Government Departments and other Boards:—

(1.) The Prime Minister and the Chancellor of the Exchequer with reference to the allocation of proposed Treasury grants to local authorities for the development of child welfare work, and suggesting the advisability of the amalgamation of all health matters in an authority, administered by one board, which should administer such grants.

(2.) Local Government Board with reference to

(a) The decline in vaccination in recent years, and suggesting that the Board should take the circumstances into consideration with a view to securing more complete protection of the community from small-pox by efficient vaccination (including revaccination.)

(b) The dismissals by authorities of the Medical Officers of Health of the Urban District Councils of Litherland and Ilford.

(c) A suggested scientific enquiry by the Board into the subject of immature veal and its alleged effect upon the health of consumers.

(3.) Board of Education and Home Office with reference to the desirability of enforcing regulations dealing with the employment of all children of school age.

(4.) British Medical Association with reference to suggested minimum salaries of assistant (junior) school medical officers being not less than £300 per annum (commencing) and advertisements being refused of such appointments at less salaries.

10. That they have given evidence before (a) the Royal Commission on Venereal Disease, presenting also a memorandum on the subject, and (b) the Birth-rate Commission.

11. That they have transferred the Secretary's banking account to the London and Joint Stock Bank (Russell Square Branch).

12. That they record with pleasure the generous gift by the executors of the late Dr. H. Franklin Parsons of a number of bound volumes

of Local Government Board Reports and other publications.

13. That they are considering the relationship of school medical officers, tuberculosis officers and other officers of other branches of the Public Health Service to the Society.

14. That they have appointed Dr. Bostock Hill as a representative on a Committee of the Royal Sanitary Institute to consider the subject of the payment of the expenses of officers and members of authorities attending congresses.

15. That they have appointed representatives to join the Deputation formed by the National Association of Clerks in connection with the Underground Workrooms Bill.

16. That they arranged jointly with the British Medical Association a deputation to the Chancellor of the Exchequer, President of the Local Government Board, and President of the Board of Education, with reference to security of tenure and superannuation of medical officers of health, and the proposals of the Society were sympathetically received.

17. That they have appointed Dr. Chalmers as the representative to act on the General Committee for the National Health Insurance, 1914.

18. That they again record with pleasure their appreciation of the valuable services rendered by the Executive Secretary, Mr. W. A. Lawton Barrister-at-Law.

REPORT OF THE HON. LIBRARIAN.

SESSION 1913-14.

To the Council of the Society of Medical Officers of Health.

GENTLEMEN,—I have the pleasure of reporting that your Library continues to increase steadily.

Thanks to the generosity of the daughters of the late Dr. H. Franklin Parsons, a number of well-bound volumes of valuable reports of the Local Government Board and of the Registrar-General have been presented to the Society. Owing to this welcome addition I have been able to complete the sets already in the Library. A number of other volumes of general public health were also given, and have been added to the Card Index.

During the past session there have been received 281 copies of reports of members of the Society and Government Departments, and 40 bound volumes have been contributed through the medium of PUBLIC HEALTH, in addition to a number of periodicals, the more important of which have been bound up for reference.

I am, Gentlemen,

Yours faithfully,

WM. BUTLER,

Hon. Librarian.

REPORT OF THE EDITOR.

SESSION 1913-1914.

To the Council of the Society of Medical Officers of Health.

GENTLEMEN,—I beg to present my report as Editor of PUBLIC HEALTH. During the 12 months to which this report relates effort has been made to present to the readers of the Journal subject matter of special interest in connection with the duties which now devolve upon the health officer. Thus the work which is now undertaken by the medical officer of health and the staff associated with him is extended to include the medical care of children in the elementary schools, bringing into public health administration the services of those possessing special knowledge and experience of particular classes of malady. So again the efforts which are now being made to prevent and to cure tuberculosis involves the employment of those who have had more than ordinary experience of tuberculous disease. Thus the scope of the work of the medical officer of health has been greatly widened, and it has become increasingly necessary to adapt the Journal to meet the growing needs of all concerned in this administration.

In large degree the papers read before the Society and its Branches have supplied the material which is required for this purpose, and these papers have been supplemented by special articles and papers dealing with the questions which now come under consideration. My thanks are due to those members of the Society who have co-operated with me in endeavouring to make the Journal supply the wants of all.

I am also much indebted to the Executive Secretary, Mr. W. A. Lawton, whose services have been invaluable in the monthly production of the Journal.

I am, Gentlemen,

Yours faithfully,

SHIRLEY F. MURPHY,
Editor.

THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

SESSION 1914-15.

REPRESENTATIVES ON COUNCIL.

EASTERN BRANCH.

President ... Dr. R. A. Glegg.
Elected Representative Dr. J. T. C. Nash.
Hon. Secretary ... Dr. A. N. Stevens.

HOME COUNTIES BRANCH.

President ... Dr. S. C. Lawrence.
Elected Representatives { Dr. H. Beale Collins.
Dr. G. F. Buchan.
Dr. A. E. Porter.
Hon. Secretary ... Dr. T. Strain.

METROPOLITAN BRANCH.

President ... Dr. H. R. Kenwood.
Elected Representatives { Dr. A. W. Harris.
Dr. P. Caldwell Smith.
Hon. Secretary ... Dr. Charles Porter.

MIDLAND BRANCH.

President ... Dr. J. M. Cowie.
Elected Representatives { Dr. T. Ridley Bailey.
Dr. H. Handford.
Hon. Secretary ... Dr. E. H. Snell.

NORTHERN BRANCH.

President ... Dr. J. W. Smith.
Elected Representative Dr. J. W. Hembrough.
Hon. Secretary ... Dr. John Taylor.

NORTH-WESTERN BRANCH.

President ... Dr. A. A. Mussen.
Elected Representatives { Dr. J. B. Wilkinson.
Dr. A. B. McMaster.
Hon. Secretary ... Dr. H. E. Corbin.

SCOTTISH BRANCH.

President ... Dr. A. Alex. Robb.
Elected Representative Dr. A. K. Chalmers.
Hon. Secretary ... Dr. G. G. Buchanan.

SOUTHERN BRANCH.

President ... Not elected.
Elected Representative Dr. R. E. Lauder.
Hon. Secretary ... Dr. J. A. Gibson.

WEST OF ENGLAND AND SOUTH WALES BRANCH.

President ... Dr. T. Evans.
Elected Representatives { Dr. J. Tubb Thomas.
Dr. W. H. Symons.
Hon. Secretary ... Dr. J. Howard Jones.

YORKSHIRE BRANCH.

President ... Dr. T. Gibson.
Elected Representatives { Dr. T. Gibson.
Dr. T. Johnstone.
Hon. Secretary ... Dr. J. R. Kaye.

Eastern Branch.—A meeting was held at Norwich on July 3rd. The minutes of the last meeting were read and confirmed. The Hon. Treasurer presented his report, which was adopted and confirmed. Officers for the forthcoming year were elected as follows:—*President*: Dr. R. A. Glegg, C.M.O., Lindsey; *Representative*: Dr. J. T. C. Nash, C.M.O., Norfolk; *Hon. Treasurer and Secretary*: Dr. A. N. Stevens, M.O.H., Great Yarmouth.

The *PRESIDENT* (Dr. J. T. C. Nash) read a paper on "A Brief Note on Two or Three Interesting 'Carrier' Problems in the Epidemiology of Summer Diarrhoea, Infantile Paralysis (Epidemic Poliomyelitis), and Pellagra."

Resolved that the next meeting of the Branch be held at Lynn on a date to be decided by the new President.

Public Health

THE JOURNAL OF

The Society of Medical Officers of Health.

No. 2.

NOVEMBER, 1914.

VOL. XXVIII.

THE PUBLIC HEALTH SERVICE AND THE NATIONAL CRISIS.

THE dominant thought of the time, the development of the fighting strength of the nation naturally found expression in the address of the newly-elected President of the Society, DR. HERBERT JONES. The need for the maintenance of "the human machine" in condition for the strenuous work which now devolves upon it in the struggle which is in progress is fully recognized, and there is no question that the ability which the British Expeditionary Forces has manifested during the last few weeks is due, in part, to the care which has been taken of the health of the troops before they were called upon to take part in the present war.

This "fitness" for active service must be a source of profound satisfaction to the Royal Army Medical Corps, whose teachings and influence have thus found justification in the results which have been obtained. Some share in this improvement of the standard of health of the army may reasonably be claimed by those who are concerned with the Civil population. Recruiting, as our president tell us, has been increasingly attended by fewer rejections. The population from which the soldier is drawn is a healthier population than in previous years, and under the careful training to which the soldier is subjected after he ceases to be a civilian his powers have been materially developed.

Under the scheme which Sir Alfred Keogh has initiated and encouraged, the soldier is still to have, while in this country, the benefit of supervision of his environment which the medical officer of health can provide. The actual manner in which the health officer's services can be rendered has not been very precisely defined, but the object of making available his expert knowledge and his familiarity with the conditions existing in his district is that which has been kept in view. Much of his opportunity for usefulness would obviously

be lost if he were removed out of the area which is normally under his supervision. The question that has been present in the minds of some, has been whether for the purpose in view he should during such a time as the present be incorporated in the military machine to the extent of being given some recognized position, which would ensure his ready access to military quarters in his district and provide for him the opportunity of putting his experience at the service of military officers. It has been thought that if some step could be taken in this direction it would facilitate the work of utilizing the civil medical officers of health in the preservation of the health of the troops.

There is no doubt that medical officers of health need no encouragement to render such services as they can. The action of the London medical officers within a few days of the outbreak of the war is index of the spirit which prompts all throughout the whole country. We have in a previous number indicated the nature of the duties which they might undertake and it is unnecessary to mention them again. We may however, recur to the importance of teaching those who may be engaged in foreign service the value of vaccination against small-pox and of inoculation against enteric fever.

The war has been of too short duration for epidemic disease to manifest itself in this country as the result of the military operations on the continent. Statements have been made in the press that enteric fever has appeared among German soldiers, but the most ominous of the news which has reached us is that cholera is spreading in the Austrian army. As winter comes on it is certainly within the limits of possibility that typhus may make its appearance and here we may think of recent teachings of the manner in which this disease is spread and the great necessity of ridding troops of any verminous conditions which may appear among them. Attention may be directed to an excellent memorandum on treatment for the destruction of vermin, which has been issued to the medical officers in the 1st London Division by Lieut.-Col. S. M. Copeman and which will be found in another column.

THE PUBLIC HEALTH SERVICE AND THE NATIONAL CRISIS.*

By HERBERT JONES, L.R.C.S.I., D.P.H.,
President of the Society of Medical Officers of Health

LADIES and Gentlemen,—Looking back upon my public health career, covering a period now approaching a quarter of a century, I am able to recall nothing but unbounded sympathy and consideration at the hands of my colleagues, culminating, as I thought 13 years ago, when you elected me one of your Hon. Secretaries. But greatly as I was already in your debt, I cannot but feel that in placing me in this chair you have added to my indebtedness, to an extent which will make the task of discharging it one of greater magnitude than I am able to undertake, even had I any desire to do so, for I would far rather be indebted to you than that you should feel under any obligation to me.

When in April last you did me the honour of electing me your President, in succession to a long line of public health administrators, distinguished not in this country alone, but throughout the civilised world, not one of us would have been bold enough to predict that we should be meeting six months later under circumstances unparalleled in the history of our Society, in the history of our country, or even in the history of the world.

In the sunny days of July, when thousands of people were holiday-making or seeking to regain their former health under cloudless skies, with never a thought of warfare or of international strife, there arose on the European political horizon, as in Israel in the days of Elijah, a little cloud no bigger than a man's hand, but as the days sped on and the holiday-makers became more sunburnt and the convalescents more robust, the cloud grew and grew, and our August bank holiday had barely passed before the sky was black and the cloud burst, and the most highly civilised nations of the world found themselves involved in a conflict which, in a few weeks, became the most sanguinary and the most horrifying of any hitherto recorded. While armies were being massed whose soldiers were numbered by millions, so that our own land forces appeared insignificant by comparison, we might almost have been pardoned in the expectation that posterity would condone inaction on our part. But where among us in the British Isles, or in Greater Britain beyond the seas, could there be found the man or woman so faithless to our

national traditions as to suggest that the blue waters surrounding our island home were security enough for ourselves, and as for our friends and neighbours let them fight their own battles, they had little concern for us. Like one man we arose and buried our national political differences—now become paltry in the face of danger to our friends—and in an instant, without the hesitation of a moment, “none was for a party and all were for the State.” The suddenness of the situation and, as some thought, our unreadiness to meet it promptly and with certain success, might well have caused dismay or even panic in our midst. But neither the one nor the other was apparent. For a twinkling we held our breath, then doggedly set ourselves to meet the position in which we found ourselves, with a determination to see it through, even though a whole generation pass away before the end shall come. To paraphrase the words put into the mouth of Richelieu by one of our great dramatists, “In the lexicon of Britain there is no such word as fail.”

My purpose this evening is to suggest to you the part that has in the past been played, that is now being played, and that will have to be played in the future by the Public Health Service in securing for the British Empire that success which every individual among us is determined at all costs must be achieved.

While our naval engineers have been engaged in improving the lines of our ships of war, whether they are vessels which ride upon the sea or those which move with expedition below its surface; while scientific chemists have been carrying on researches having for their object the increased efficiency of explosives; while gunsmiths have been perfecting the accuracy and the range of our weapons; while that third arm of offence and of defence, the aeroplane, now almost for the first time utilised in actual warfare, has been brought to such perfection: while men of eminence have been engaged quietly and without ostentation in improving these machines and implements of war to a degree which half a century back would have seemed inconceivable, others equally eminent have been training and perfecting those human machines without whose skilled assistance our warships could not move, our submarines could not sink or our aeroplanes take flight, and without whose aid our cannon, our rifles, and our pistols would be dumb.

Just as the human machine is seriously handicapped if the inanimate machine it controls is imperfect either in design or

construction, so it is equally true that the best results will not be obtained from the inanimate machine if the controlling human machine is lacking in essential qualities. As members of the public health service we may claim to have assisted in the improvement and development of the human machine, and thus to have secured for our generals and admirals large bodies of men whose intelligence, whose staying powers, and whose physical fitness must of necessity be incomparably better than they would have been had our slums remained unventilated, our mines and factories continued unventilated, our water supplies polluted or insufficient, or our drainage and sewage disposal unimproved. I am quite aware that there are other factors than those with which we are most intimately concerned which must be credited with a share in the improved physique of our fellow-countrymen who are now engaged in defending and in preparing to defend the honour of the Empire. Good trade, carrying with it regular employment and steady wages, must not be left out of account, nor must there be forgotten the enormous strides that have been made in recent years in other branches of our own profession. The physician and the surgeon have brought their art to such perfection that they are now able to return to active life tens of thousands of their patients, in a condition no worse than when attacked by disease or crippled by accident, whereas the days are not so long ago when the majority of these would have had to be included among those who, much to their mortification and disappointment, have to be recorded as medically unfit for military service. But however good and regular are the wages of the workman, however skilfully his rheumatism may have been treated or his appendix removed, he could not have arrived at his present standard of physical fitness if he had been allowed to live amid surroundings and under conditions which prevailed fifty years ago, and which have been amended or ended through the instrumentality and persistence of medical officers of health. If anyone doubts the contention that our army has a distinctly better material to draw from with which to fill its ranks, let him refer to the official records of recruiting. Twenty years ago 40 per cent. of recruits were rejected on medical inspection. Ten years later the percentage of rejections was reduced to 30, and now it is little over 20. This satisfactory reduction means that if it had not occurred

and if the percentage of rejections had remained the same as it was twenty years ago, there would be at the present moment half a million fewer unmarried men of military age in England and Wales alone who are available for military service. The public health service may claim therefore to have taken a prominent part in presenting to the nation this additional potential army of five hundred thousand men. The consciousness that we have done something, however slight, in the direction indicated, should be sufficient recompense for our efforts; but we shall not be without a direct reward, because the necessity that has arisen for enlarging our army has incidentally brought about a set of circumstances which cannot fail to react to our advantage on our labours in the future. For many weeks past there have been under military training somewhere about a million men, and it cannot be denied that this training is a public health measure of the first importance. The carrying out of regular and systematised physical exercises, the constant drilling, the adoption of orderly habits, and the inculcation, at the hands of their officers, of a knowledge of the best way to make themselves fit—is of the utmost value even in the case of the ordinary recruits, a proportion of whom are unskilled workmen or men with a limited education, and who join the Army as a means of gaining a livelihood. But the advantages are immeasurably enhanced with respect to those who have lately joined the Regular Army or the Territorial Force, for these include to a preponderating extent men of education, and who from purely patriotic motives are determined to make themselves efficient not only physically but in the details of their duties in the shortest possible period of time. They may be said to be undergoing training intensively. In the small unit—the Mounted Field Ambulance—with which I am privileged to be associated the improvement is remarkable that a few weeks of systematic training has brought about in the recruits. Rounded shoulders have been flattened, chests have been expanded, flabby muscles have been hardened, and in many other ways robustness has been secured. If the same results are taking place, as I have no doubt they are, with other units, we are gathering together a huge body of men who not only will be capable of successfully defending our shores or of assisting our neighbours in repelling the invader, but in due time they will be a very distinct

*Presidential Address to the Society of Medical Officers of Health, delivered on 16th October, 1914.

asset in improving our race. We are never tired of insisting upon the importance of keeping our bodies in such a fit condition that when brought into close contact with disease germs these will find no soil suitable for their development or multiplication, and to have a million men, and I trust many more, brought to such a healthy state and instructed in the best way of retaining it must appreciably affect the incidence of disease in the future.

We who are engaged in public health work in this country are ever ready to acknowledge our indebtedness to the Army Medical School, established first at Fort Pitt Hospital, Chatham, just 54 years ago, moved, in 1863, when the Royal Victoria Hospital was completed, to Netley, and in 1900 again moved to London, when it was styled the Royal Army Medical College. The creation of this school, which has a world-wide reputation, was due to the prescience of Sidney Herbert, at that date Secretary of State for War, who was the leading spirit in its establishment, and in which he was ably assisted by Sir James Clark, Sir Ronald Martin, and Dr. Edmund Parkes, F.R.S., who was the first Professor of Hygiene attached to the school, and who may be said to have created hygiene as a science in this country. "His assistant and successor, de Chaumont," to quote from a letter I lately received from Lieut.-Colonel A. M. Davies, "was a wonderful man, practically omniscient, who has never been adequately recognised. He was content to 'edit Parkes,' but was really a scientific observer of the very highest ability." Col. Lane Nottle in 1887, and later Col. R. H. Firth were Professors of Hygiene at Netley, and Colonel Firth was the first to hold the same position in the Royal Army Medical College. He was succeeded in 1905 by Lieut.-Col. A. M. Davies, who retired in 1908, and was succeeded by Lieut.-Col. C. H. Melville. Lieut.-Col. W. W. O. Beveridge was appointed Professor in 1913. To quote again from Lieut.-Col. Davies, with whom we shall all agree, Sir Thomas Longmore in Military Surgery, Professor Maclean in Tropical Medicine, were respectively almost the founders of modern medical science in those branches, while Sir Almroth Wright as Professor of Pathology, did pioneer work at Netley. Though many of those I have named were primarily concerned with military hygiene their writings had an immense influence upon the science as it affects civilian communities. It is however remarkable that the teachings of Parkes and his

immediate successors had far greater practical results outside the particular area of their activities than they had within, and it was not until the closing years of the last century, that the advice given by a distinguished Field Marshal to his Generals, to leave their sanitary officers at the base as their duties were only a modern fad, came to be considered as unsound and so detrimental to the efficiency of the troops that if acted upon it could only spell disaster. Even in the South African War, when more men were rendered *hors de combat* by preventable disease than by the bullets of the enemy, the authorities considered it unnecessary to employ on the spot medical officers who had special knowledge of sanitary matters. The lessons we ourselves were taught in the school of bitter experience in South Africa, added to the disastrous experience of the Americans in the war with Spain when there were in five months 20,000 cases of typhoid fever among 250,000 troops, had the effect of hastening reforms which had long been advocated by responsible persons, and in the early years of the present century military sanitation and the teaching of hygiene were no longer described, even in military pocket books, as fads, but were recognised as essentials in successful military movements.

With the creation of the Territorial Force, opportunity was taken to include in the new body provision for a sanitary service. Included in the Regulations for the Territorial Force is the following:—

"A Sanitary Officer is appointed to the headquarters of each division of the Territorial Force. He must be in possession of a registrable or registered diploma or certificate of proficiency in sanitary science, public health or state medicine."

There are in Great Britain 14 Territorial Divisions, and thus 14 sanitary officers, of whom 12 are Fellows of this Society, 10 of the latter being medical officers of health, one is connected with the Local Government Board of England and Wales, and one with the Local Government Board for Scotland.

It will be in the recollection of many of you that at the end of 1907 Sir Alfred Keogh, who was at that time Director-General of the Army Medical Department, placed before this Society a scheme for the employment of civil medical officers of health in the event of mobilisation or of the invasion of this country. He suggested that medical officers of health

should combine in a great voluntary organisation, having for its object the preservation of the health of the large masses of men who might one day be required to defend the country. He asked us to take voluntarily upon ourselves the duty of considering the problems to be solved during active operations within our home areas; to be ready should the day come when we might have to defend ourselves at home to place our knowledge and experience at the disposal of the authorities commanding their divisions of the Territorial Force. The outcome of this suggestion was the creation of the *à la suite* Sanitary Service, which is referred to in the following Regulation for the Territorial Force:—

"Specialists holding health appointments in the various counties may be appointed to the sanitary branch of the R.A.M.C. as officers whose services will be available on mobilisation, receiving substantive rank. Their names will be borne on a separate list according to a fixed establishment, and they will be given promotion according to vacancies on that list. They will perform no duties and receive no emoluments, except when called out on mobilisation, when they will receive the usual remuneration of their rank in the corps. On mobilisation they will be appointed under the arrangements of the A.D.M.S. within whose divisional areas they hold health appointments, to perform sanitary duties within their districts if to be occupied by troops.

The establishment of officers of the sanitary branch is 20 lieutenant-colonels, 40 majors and 60 captains."

Those who were first given commissions in this new service were officially informed that the appointment entailed no duties in time of peace, other than those they might voluntarily undertake towards assisting the A.D.M.S. of their districts, in his endeavours to provide for lectures and practical demonstrations in sanitation in the R.A.M.C. school of instruction Territorial Force. They were further told that in time of invasion or of national emergency they might be called upon to perform in and in the vicinity of their civil sphere the duties required of specialist sanitary officers.

The scheme as it was propounded by Sir Alfred Keogh was admirable in its conception, for it sought to make the most use possible not only of the special sanitary knowledge but also of the special local knowledge possessed by

medical officers of health. Its great power for good was however limited, owing to certain conditions which were inserted in the Regulation of the Territorial Force which governs the new service and which I have already quoted *in extenso*. The duties of the officers of the service can only be carried out within their own civil districts and the establishment is limited to 120 officers. Although the first officers to be given commissions were located, with some noticeable exceptions, in districts all over Great Britain more or less remote from one another, the change of service from one local authority to another which is constantly taking place among medical officers of health in a few years had quite altered the geographical arrangement which was at first manifest. It would have been extremely difficult therefore to have allocated to each member of the service a more or less extensive area in which he should take up duty. Moreover, this was made impossible owing to the Regulation stating definitely that the duties of the service could only be exercised within the civil district of the officer, and not as was apparently at first intended "in or in the vicinity of" his civil sphere. A further difficulty in mobilising the sanitary service has arisen owing to the headquarters of some Territorial Divisions being moved out of their territorial area, so that it is doubtful whether it is competent for the A.D.M.S., being temporarily away from his proper area to make arrangements as prescribed by the Regulations for the mobilisation of particular members of the sanitary service.

Fortunately, however, the principles underlying the scheme are being carried out in another manner to good purpose. The medical officer of the Local Government Board in a communication addressed to all medical officers of health invited those officers of districts in which troops were, or were likely to be stationed, to place themselves in communication with the local military authorities offering any services which might be useful. The special directions in which it was suggested the services of the medical officer of health might be of use were in advising as to all local water supplies and as to their protection from contamination; in helping to secure satisfactory disposal of garbage and other refuse; in securing satisfactory drainage or conservancy arrangements, and in the control of infectious disease, arranging for hospital provision for the ordinary infectious diseases and for convalescent cases of typhoid

fever, and for the carrying out of disinfection.

The Army Council has also taken steps to make the services of medical officers of health available in the interests of troops, and has pointed out to General Officers Commanding-in-Chief of Commands that the medical officer of health is in the best position to give information respecting the existence of infectious diseases, water supplies, drainage, localities where latrines should be placed, etc. With regard to the billeting of troops the medical officer of health is now to be communicated with before troops march into his district, with a view to obtaining his expert advice and co-operation in arranging the billets under the best sanitary conditions available. In the case of towns a telegram will be sent in advance to the medical officer of health appointing a time and place of meeting with the billeting officers, who are sent in advance to arrange for the housing of troops. In districts outside towns a telegram in similar terms will be sent to the medical officer of health of the county in which the troops are to be billeted. At Territorial Force Headquarters the medical officer of health will be consulted before men are furnished with billets, and where camps are formed and maintained he will be consulted and his visits encouraged.

Having in mind, therefore, the timely action of the Local Government Board on the one hand and of the Army Council on the other, there seems a probability that the co-operation between the civil and military authorities will in future be on a satisfactory footing. Medical officers of health must, however, remember that they are merely advisers. It may not be possible, for military reasons, to act upon the advice given however correct it may be from a sanitary point of view. This aspect of the duties of a sanitary adviser is too often overlooked by medical officers of health, and may account to some extent for the reluctance of certain military officers to consult them. The recommendations of the medical officer of health must be reasonable, and when he is considering their reasonableness he must be guided not by ordinary civil conditions, but by the special military circumstances prevailing at the time.

I now come to the question of the future development of a civil sanitary service, which shall be closely associated when necessity arises with the military service. It has been suggested in some quarters that the existing *à la suite* corps should be re-organised, but that

its members should be drawn exclusively from the ranks of the medical officers of health of counties and county and metropolitan boroughs, each one of whom should be given a commission. The fatal objection to this proposal is that among the 14 sanitary officers of the Territorial divisions 10 are medical officers of health of those districts, and they are certainly better employed than they would be in the *à la suite* service. A better plan, in my opinion, would be to reorganise the service on a geographical basis, and no longer restrict the duties of the officers to the areas of their civil activities. In this way there would be comparatively little upheaval of or alteration in the scheme as propounded to us by Sir Alfred Keogh, and those members of the service who are not medical officers of health of counties but who have in the past few years been paying particular attention to the duties likely to fall upon them on mobilisation would be retained in the service to the advantage of the troops.

There is another direction in which it appears to me the public health service, and especially the whole-time members of the service, might be more closely associated with the Territorial Force than is at present the case. In the term public health service I include not only medical officers of health both chiefs and assistants, but also school medical officers, assistant school medical officers, and tuberculosis officers. The R.A.M.C.T.F. includes nearly a thousand medical practitioners, the majority of whom are in private practice. They have to make large sacrifices both of leisure and of money in order to make themselves proficient in their military duties, and at a time such as the present, when the whole Territorial Force is mobilised, there must be considerable dislocation of practices all over the country through the absence of practitioners on military duty. There would, however, be a minimum of disarrangement if the officers of the R.A.M.C.T.F. were largely recruited, as I think they should be, from the whole-time public health service. In the case of medical officers of health two or more districts could be placed temporarily under the charge of one officer, who on account of age or for some other justifiable reason was not connected with the Territorial Force. The work of whole-time school medical officers, or of their assistants, and of tuberculosis officers could be carried on temporarily by private practitioners, an arrangement adopted in some

districts at the present time, and which has in it the elements of simplicity and success. I cannot help referring to the advantage it would have been to us had there been in operation in the past years the scheme of superannuation so long advocated by this Society. We should by now have had available a reserve of public health officials ready to return for a time to their former duties, and so release junior members of the service for active military duty.

Although an attempt has been made to compile a list of the medical officers of health now serving in our army, it has been found difficult to do so with complete accuracy. The number is probably approaching a hundred, and the majority are Fellows of this Society. Among them are your President and four Past-Presidents. Officers of the Branches, both past and present, are also largely represented in the Territorial Force. Already, unhappily, toll has been levied from among us, and we have to mourn the loss of Henry Leslie Hopkins, Lieutenant R.A.M.C., who joined the army immediately war broke out, and was serving with the Expeditionary Force in France, where he was killed on Sept. 19th.

The public health service has a record of past achievements carried out oftentimes under difficulties which bring despair to our hearts. Closely associated with those achievements, nay, not rarely responsible for them, is this great Society of Medical Officers of Health, whose honourable traditions every one of us is determined strenuously to uphold. Our responsibilities in the past have been indeed great. In the coming months they will be increased tenfold. Neglect on our part might decimate an army corps. Alertness and promptness of action may prevent catastrophe.

I have every confidence that we all realise the immense importance of the increased responsibilities cast upon us. I am equally confident that each one of us has determined that the most exacting, the most strenuous service we are called upon by the State to perform will be rendered freely and willingly, nay with gladness and enthusiasm. God grant that the task allotted to us in this time of our Nation's peril may be undertaken with such faithfulness and loyalty that those who succeed us may recall us with pride, and may feel as we do that to be connected with such a Service as ours is an honour and a privilege indeed.

SHAKESPEAREAN REFERENCES TO PUBLIC HEALTH AND KINDRED SUBJECTS.*

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THERE are very few professions, or trades of any importance, in respect of which Shakespearean references relating thereto have not been collected. The medical knowledge of Shakespeare has formed the basis of more than one interesting article, and the following contribution, which bears no pretence of originality, deals with a sub-division of medicine and presents a collection of references immediately or remotely concerned with public health. The notes are culled from various sources, and in the circumstances it is hardly necessary that detailed references should be given—nevertheless the monumental work of Dr. Creighton on the "History of Epidemics in Britain" should be mentioned; that work has been freely used, as will be readily recognised.

The plays of Shakespeare embrace the widest variety of human experiences, and the extraordinary range of the poet's knowledge and his remarkable powers of observation are fully appreciated when the plays are read with the object of discovering references to some special subject previously decided upon.

Preventive medicine in the Elizabethan days was of a primitive character, but although that was the case, many of what are now regarded as fundamentals were then appreciated. The main weakness was not the want of recognition of the causes which gave rise to preventable diseases, but the lack of administrative machinery necessary to ensure that sound ordinances were duly observed. Such sanitary regulations as existed were perhaps better observed in the towns than in the country, but even allowing for this I think it doubtful that towns were healthier than the country.

England of the early days is frequently referred to as "Merrie England," but strife, famines and epidemics were sufficiently frequent, and conditions of life, in many respects, sufficiently depressing, to justify a doubt arising as to whether the term is not somewhat fanciful.

Compared with the condition of other countries of Europe at that time, the term is perhaps accurate, but there can be little doubt that the people of the present day pass their lives under conditions which will compare most favourably with those of the earlier period.

* Presidential Address, Home Counties Branch, October, 1912.

Many attempts have been made during recent years to prove that the present race is undergoing a more or less rapid deterioration, and frequently, statistics, proving decrease of stature, have been submitted as evidence of this retrogression. Without considering whether physical development as exemplified by height and weight may not depend, to some extent, on adaptability to altered environment, and therefore be not an indication of deterioration, it is interesting to note the opinion of Alençon respecting the physical characteristics of the English soldiers at the raising of the Siege of Orleans. (The date of the incident is October, 1426).

"Froissart, a countryman of ours, records England all Olivers and Rowlands bred During the time Edward the Third did reign. More truly now may this be verified; For none but Samsons and Goliases It sendeth forth to skirmish. One to ten! Lean raw-boned rascals, who would e'er suppose They had such courage and audacity."

Physical strength as typified by Samson, stature by Goliath and courage by Oliver and Roland are examples well chosen. The biblical characters stand for the ideal in their respective classes, and the legend of Roland and Oliver suggests heroism in the highest sense. These two personages with their followers fought against the Saracens in the days of Charlemagne.

"Help us, Mahound!" say the heathen train,
"May our gods avenge us on Charlemaine!
Such daring felons he hither sent,
Who will hold the field till their lives be spent."

The state of the times was such that there must have been a considerable number of human derelicts, and epidemics engendered either by insanitary conditions or introduced by wanderers returning from abroad were frequent.

The recurrence of these epidemics was an important factor in the social life of the community, and it is not surprising Shakespeare's characters frequently mentioning these disorders, in terms which can only be read as indicating the important influence they had on national life. King Henry the Fourth bemoans "the body of our kingdom how foul it is; what rank diseases grow, and with what danger, near the heart of it."

Timon of Athens includes among the terrors to which he would submit the citizens, "Plagues incident to men, your potent and infectious fevers heap on Athens."

King Richard the Second, with a touch of religious fervour, observes, "Yet know, my master, God omnipotent, is mustering in his

clouds on our behalf armies of pestilence; and they shall strike your children yet unborn and unbegot."

Although these pestilences were of devastating effect, the country apparently was free from that most terrible scourge of this period of Southern and Middle Europe, "war fever," and we find Gaunt, in "Richard II," eulogising "This blessed plot, this earth, this realm, this England," as being "a fortress built by nature for herself, against infection and the hand of war."

The chief "war fevers" were of course typhus, relapsing fever and spotted fever, and epidemics of these ailments, originating as a sequel of warfare, were notably absent between the unrest of the time of Stephen and the struggle between the Parliament and the Crown. The Civil Wars between the rival Houses of York and Lancaster gave rise to very little trouble of this nature, but in the Parliamentary struggle it is recorded that when Reading yielded to the Parliamentary Forces under Lord Essex on April 15th, 1643, the town was severely affected "with sickness," which subsequently spread with great rapidity among the victorious forces.

Apart from the "war fever," the chief epidemics were plague, the sweat, and perhaps syphilis. We find frequent references to the plague, such as "Plague right well prevented" ("Much Ado about Nothing.") "Even so quickly may one catch the plague" ("Twelfth Night.") "Thou art a boil, a plague sore, an embossed carbuncle" ("King Lear.") In "Coriolanus" the wish is expressed by Volumnia that the "red pestilence strike all trades in Rome and occupations perish," and in "Anthony and Cleopatra," "How appears the fight? On our side like the tokened pestilence, where death is sure." "Tokened," in this sense, indicates the spots of the different pestilential diseases, and is similarly used in the passage "Like the fearful tokens of the plague, are mere forerunners of their ends." Plague was also called "The Botch" down to Elizabethan times. The word "botchy" means to be covered with excrescences, but I have not observed that the disease has been so named in Shakespeare.

As regards "the sweat," reference is made to this disease in the Epilogue to the second part of "Henry IV.," "where, for anything I know, Falstaff should die of the sweat"; and the bawd, in "Measure for Measure," thus bemoans her lack of trade, "What with the

war, what with the sweat, what with the gallows, and what with poverty, I am custom-shrunk." As regards the word "sweat" in this sentence, I have seen it suggested that it has reference to the sweating process which is said to have been much in vogue at this period as an antidote to the risks of illicit intercourse.

Measles is only once referred to, but at this period it was a generic term, and included many diseases. Probably in the following quotation from "Coriolanus" it has reference to leprosy:—"So shall my lungs coin words, till they decay 'gainst this measles, which we disdain, should tetter us; yet sought a very way to catch them."

Plague appeared first in England in 1348, and remained endemic, with epidemic recurrences, down to 1666. It was the chief zymotic of this period, and was essentially a disease of the poor, affecting those who were worst housed and worst fed. Prior to the introduction of plague, it is interesting to note that there were three different epidemics in Europe, named from the countries in which they were considered to be most prevalent, viz., the English "famine fever," the "St. Anthony's Fire" of France, and the "leprosy" of Normandy.

"The sweat," likewise, was known all over Europe as "Sudor Anglicus." It was a new type of disease, which was introduced in 1485, and left the country finally in 1551, to be no more heard of, but during that period five great epidemics were reported. It was not nearly so fatal as plague. The duration of the illness was short, and it is remarkable that it is reported to have attacked the rich whilst the poor were to some extent immune.

It was a prevalent theory that contagious diseases were air-borne. Apparently it was considered possible that they could be originated *de novo* as a consequence of air pollution, and that a person being attacked could give the disease to others. Numerous references to this air-borne theory are to be found throughout Shakespeare's works, the best known being the one in "Macbeth," "Infected be the air whereon they ride"; in "Twelfth Night," "Methought she purged the air of pestilence"; in "Richard II.," "Devouring pestilence hangs in our air."

The most generous wish which Leon could extend to his guests in "The Winter's Tale" is—

"The blessed gods purge all infection from our air whilst you do climate here."

Of all polluting influences there is little doubt that the emanations from dead bodies were regarded as being the most serious source of danger, and every effort was made to bury the dead, and so avoid pestilence. The most apt expression of this view is that contained in "Henry V.," when he sends back the defiant message and threat to the King of France:—

"Those that leave their valiant bones in France,
Dying like men, though buried in your dung-hills,
They shall be famed, for there the sun shall greet them,
And draw their humours reeking up to heaven,
Leaving their earthly parts to choke your clime
The smell whereof shall breed a plague in France."

The two chief precautionary measures referred to in Shakespeare are in "Romeo and Juliet"—

"And finding him, the searcher of the town,
Suspecting that we both were in a house
Where the infectious pestilence did reign,
Sealed up the doors and would not let us loose,"
and in "Love's Labour Lost"—

"Lord have mercy on us, on those three,
They are infected, in their hearts it lies,
They have the plague and caught it at your eyes,"

where, of course, the reference is used in a punning sense.

These precautionary measures undoubtedly have reference to the plague ordinances which were issued at that time. Apart from State advice, it was generally held that the safest course to adopt during an outbreak of plague was to desert the town and seek refuge in the country, though a considerable amount of prevalence was tolerated before men fled. To flee was not altogether regarded as a desirable course to adopt, and we read of at least one clergyman holding forth on the disgrace of flight and the desertion of afflicted friends. On the other hand, Wolsey pointed out to the Earl of Shrewsbury that to get into the clean air was the safest course to adopt.

Isolation and notification were, in an elementary form, adopted at Oxford in 1518, when the edict went forth that the inhabitants of infected houses should keep indoors, display wisps, and when going forth in the streets should carry white wands.

The first Plague Order, of which the full text exists, was issued in 1543, and required the observance of the following restrictions:—

The sign of the cross to be marked on the door of infected houses, and such mark to continue for forty days after infection.

No person afflicted with plague to mingle with other people if he could possibly live by himself, but if he could not do so he should not

go abroad for forty days unless he carried in his hand a white rod two feet long.

Straw from infected houses was required to be taken into the field privately at night and burned.

Diseased persons were not to be turned out of doors, unless other housing was provided.

Restrictions required that dogs, other than hounds, spaniels and mastiffs, should be destroyed, and that even the latter should not be given their freedom.

Common beggars were ordered to be kept out of church, and streets to be cleansed.

The text, "Lord have mercy upon us," was written on the door above a St. Anthony's Cross, which was a crutch such as was used by the Crutched Friars. It was at first painted blue, but in 1603 the colour was changed to red.

The regulation against dogs above referred to was made because it was considered that they might carry infection. Mr. Wheatley, in "The Story of London," quotes Brasbridge in his "Poor Man's Journal," 1578, who relates how, "Not many years since I knew a glover in Oxford who with his family to the number of ten or eleven persons died of the plague, which was said to be brought into the house by a dogge skinned that his wife bought when the disease was in the citie."

Thousands of dogs were killed, and cats came under the ban at a later date.

The above regulations form the basis of all subsequent ordinances; and in 1568 the City of London issued more complete orders, which were also adopted by the City of Westminster. By these orders houses were required to be shut up for only twenty days, and infected houses were visited for the purpose of supplying the various necessities of life. We even find that special precautions were taken in regard to infected houses where wearing apparel was sold.

Scavenging orders became more stringent under Elizabeth. The chief effluvia nuisances resulted from the slaughter of animals, and probably the blood and offal in the shambles which existed in Newgate Street were partly responsible for the precautionary measures which were issued in the reign of Richard II. The fly nuisance was then, as now, a feature of the summer months, and we find in "Othello"—

"As summer flies are in the shambles,
That quicken even with blowing."

in "Coriolanus"—

"With no less confidence than boys pursuing
Summer butterflies, or butchers killing flies."

and in 3 "Henry VI."—

"The common people swarm like summer flies,"
and "Henry V."—

"For maids, well summered and warm kept, are like
flies at Bartholomew-tide, blind, though they have their
eyes."

St. Bartholomew's Day was August 24th.

Such diseases as small-pox and plague mostly affected children; in fact, plague has been called *pestis puerorum*; and expression in "Hamlet" is given to the liability of children to attack by zymotics. "In the morn and liquid dew of youth contagious blastments are most imminent."

The most direct reference in Shakespeare's works to consumption is in "Much Ado About Nothing," where Beatrice observes to Benedict—

"I yield upon great persuasion and partly to save your
For I was told you were in a consumption." [life,

She possibly regarded the disease as curable; but Falstaff, on the other hand, regarded "consumption of the purse" as an "incurable and lingering disease."

As regards tuberculosis of the skin, there is the well-known reference in "Macbeth" to the disease known as "King's Evil."

(Enter a Doctor.)

Malcolm— Comes the king forth, I pray you?

Doctor— Ah, Sir; there are a crew of wretched souls
That stay his cure; their malady convinces
The great assay of art; but at his touch
Such sanctity hath Heaven given his hand,
They presently amend.

Macduff— What's the disease he means?

Malcolm— 'Tis called the evil;
A most miraculous work in this good king,
Which often, since my here-remain in [England,
I have seen him do. How he solicits Heaven,
Himself best knows; but strangely-visited [people,
All swoln and ulcerous, pitiful to the eye,
The mere despair of surgery, he cures;
Hanging a golden stamp about their necks,
Put on with holy prayers; and it is spoken,
To the succeeding royalty he leaves
The healing benediction.

The miraculous power associated with the "Royal touch" was confined among the nations of Europe to the Kings of England and France. The first Sovereign to make a public display of this so-called power was Edward the Third, who washed the feet of the patient before proceeding to touch him, but this requirement was dispensed with by Henry the Seventh. The French trace the possession of the virtue to Clovis, the first Christian King of France, who ascended the throne in 481 A.D.,

and the English to Edward the Confessor, who died in 1066.

Shakespeare uses the words "hanging a golden stamp about their necks" as part of the ritual for the cure, in addition to touching by royal hands and the offering of special prayers. These prayers were included in the Book of Common Prayer until 1719. Charles the Second struck a special coin, which was called a "touchpiece." It was in this reign that the ceremony reached the height of its popularity, when some 100,000 persons are said to have been "touched." A story is told by one Dr. Pegge, who lived at Osmaston, in Derbyshire, that a certain old man had, in giving evidence, fixed a date by Queen Anne having been at Oxford and touched him for the evil whilst a child. When he had finished his evidence he was asked whether he was really cured, upon which he answered, with a significant smile, that he believed he had never suffered from the evil, but his parents were poor and had no objection to the bit of gold. Dr. Samuel Johnson, who suffered from scrofula, was taken by his parents to receive the royal touch from Queen Anne on March 30th, 1714. He was examined by the court surgeon, prayed over by the court chaplain, and stroked and presented with a piece of gold by Queen Anne, but he failed to be cured. His recorded impressions are "a sort of solemn recollection of a lady in diamonds and a long black hood."

William of Orange refused "to touch" and referred applicants to James the Second, exiled at St. Germain. James Stuart, the old Pretender, used to touch in Italy, as also did his two sons, Charles, the Young Pretender, and Henry, Cardinal of York.

Syphilis was a most common disease in Shakespeare's time, and at the end of the fifteenth century it was undoubtedly epidemic throughout Europe, the disease being then of a most virulent type. Very little was then known of the tertiary lesions, but undoubtedly the secondary symptoms were well recognised, and in "Timon of Athens" is a fairly satisfactory description of the disease as it would be recognised at that time:—

" Crack the lawyer's voice,
That he may never more false title plead,
Nor sound his quilllets shrilly: hoar the flamen,
That scolds against the quality of flesh,
And not believes himself; down with the nose,
Down with it flat; take the bridge quite away
Of him that, his particular to foresee,
Smells from the general weal: make curled-pate ruffians
bald;

And let the unscarred braggarts of the war
Derive some pain from you."

The following quotations may be regarded as suggesting a preventive measure. In "Measure for Measure" it is advised that "All houses in the suburbs of Vienna must be plucked down," and, in the same play, there is contained the query of one who is interested in the existence of "stews." "But shall all our houses of resort in the suburbs be pulled down?" to which the reply was "to the ground, mistress."

Creighton points out that Shakespeare had precedents in London for the situation which he created in a foreign city, for he records that in 1506 "stews" were suppressed on Bank Side in Southwark, that these resorts were of ancient date, and that for long they had paid toll to the Bishop of Winchester. There were eighteen of these places in a row along the Surrey side of the river, wooden erections, each marked by some sign such as that used for the tavern. Although they were closed, it was not long before they were opened again, the number being restricted to twelve. They had been suppressed once before, in the reign of Henry the Fourth, and probably again in 1546.

At the time of Shakespeare, midwifery was almost exclusively in the hands of women, it being considered disgraceful for a man to engage in it. Such an undertaking was regarded as an abominable attempt on the virtue and honour of the female sex. The science of midwifery, however, began to advance about this time, aided by improvements in printing and engraving. Previously persons who were extremely ignorant carried on the work. The word "midwife" is used somewhat contemptuously in "Twelfth Night":—Maria: "Nay, but say true, does it work upon him?" Sir Toby Belch: "Like aqua vitæ with a midwife."

The ignorance of midwives is suggested in "King Henry VI.," where Gloucester, referring to his having come into the world with legs forward—"The midwife wondered, and the women cried, 'O, Jesus, bless us, he is born with teeth!'"

Queen Mab is stated to be the Fairies' Midwife in "Romeo and Juliet," and that the highest ladies in the land were attended by midwives would appear to be the fact, as the Empress in "Titus Andronicus" was attended by a midwife. It was about the middle of the seventeenth century that it became the fashion to engage a physician to

attend an ordinary case of midwifery. From this time doctors were able to study the phenomena of ordinary labour, and, as stated above, the printing press gave facilities for experiences to be circulated among the profession.

Monstrosities and birth-marks on children were regarded as being due to malevolent influences and two opposite wishes are very aptly set out in the two following quotations. Oberon, in "A Midsummer Night's Dream," expresses the generous hope that—

"The blots of Nature's hand
Shall not in their issue stand;
Never mole, hare-lip, nor scar,
Nor mark prodigious, such as are
Despised in nativity,
Shall upon their children be,"

which compares with the curse of Ann, in "King Richard III."—

"If ever he have child, abortive be it, prodigious, and untimely brought to light, whose ugly and unnatural aspect may fright the hopeful mother at the view."

One of the tricks of the nursery is well illustrated by the observation in "Romeo and Juliet." The nurse, becoming reminiscent, revives memories of Juliet as a baby:—

"'Tis since the earthquake now eleven years;
And she was weaned—I never shall forget it—
Of all the days of the year, upon that day;
For I had then laid wormwood to my dug,

Nay, I do bear a brain:—but, as I said,
When it did taste the wormwood on the nipple
Of my dug, and felt it bitter, pretty fool,
To see it tetchy, and fall out with the dug!"

Bitter aloes and similar substances have been used to help in the weaning of babies, probably from time immemorial.

Several volumes have been written respecting the nature of the madness displayed by certain of Shakespeare's characters, and I need only make brief reference to two which remind one of medical inspection work. In "Cymbeline," the son of the Queen is referred to in these terms:—"That such a crafty devil as is his mother should yield the world this ass! a woman that bears all down with her brain; and this her son cannot take two from twenty, for his heart, and leave eighteen." It appears a matter of surprise that a woman of her character should be the mother of such a degenerate son, but the mother would afford material for an interesting study, and I cannot but think that her life, her scheming, and her end all give evidence of a mental state badly balanced, such as one might expect to find in a morally defective person, and that being so, her offspring might easily be

mentally defective. Another type is that of the physically defective person with moral deficiency, as shown in the character of Richard, Duke of Gloucester—later Richard III. Some time in his early development, either before or after birth, his nervous system suffered severe disorganisation, and it is not surprising that this misfortune should have influenced his mental state. The deficiency is marked in respect of both the physical and moral sides of his character, and he appreciates his own physical deficiencies, for he describes himself as follows:—

"But I, that am not shaped for sportive tricks,
Nor made to court an amorous looking-glass;
I, that am rudely stamped, and want love's majesty
To strut before a wanton ambling nymph;
I, that am curtailed of this fair proportion,
Cheated of feature by dissembling nature,
Deformed, unfinished, sent before my time
Into this breathing world, scarce half made up,
And that so lamely and unfashionable
That dogs bark at me as I halt by them;—
Why I, in this weak piping time of peace,
Have no delight to pass away the time,
Unless to spy my shadow in the sun
And descant on mine own deformity."

His mother, referring to his early life, gives a clue to what might be expected of him in later life:—

"A grievous burthen was thy birth to me;
Tetchy and wayward was thy infancy;
Thy school-days frightful, desperate, wild and furious,
Thy prime of manhood daring, bold and venturous,
Thy age confirmed, proud, subtle, bloody, treacherous,
More mild, but yet more harmful."

Although not taken from Shakespeare, it perhaps may not be out of place as showing the status of the medical man who looked after the Pest House, if I mention that in 1611 there was a recognised surgeon to the City Fever Institution. In that year he petitioned for a pension, and the City authorities agreed to give him £3 a year. This seems totally inadequate when one notes that his friend and former acquaintance did "utterly refuse to use him in his profession." This objection is one which is not infrequently used in advancing a claim to a whole-time appointment, when the control of the fever hospital is included in the duties.

In conclusion, I have only to state that the references quoted by no means include the whole of the material which can be extracted from the works of Shakespeare for a paper of this description. Sufficient has been submitted to illustrate some of the ideas which were held during his day.

THE LATE SIR HENRY LITTLEJOHN, M.D.

THE news of the death of Sir Henry Littlejohn will have been received with great regret by all medical officers of health and especially by the older members of our Society, who had the pleasure of regarding him as an active colleague in the work of the preservation of the public health. Sir Henry Littlejohn was a pioneer in this work, taking a leading position in laying the foundations of the great administration which is now in operation throughout the country. His own duties lay in Edinburgh, where his work as medical officer of health

was busy. He was a born teacher, because he knew how to make the most of his points. He could hold his audience as few professors were able to do. If he raised a laugh either in the class-room or out of it, he had a purpose in view. One had but to recall the laugh to remember the fact which had provoked the hilarity. As an administrator he was an unquestioned success, because he understood human nature. Few men possessed the gift—one might call it the power—of taking stock of his fellows so thoroughly and instantaneously as Sir Henry Littlejohn. This faculty was of immense value to him in the committee-room,



began in 1862. At this time he was 34 years of age, and was thus able to bring a mature mind to bear on the problems which confronted him. His period of service extended to 46 years, thus giving opportunity for continuity of effort which is so necessary for administration if it is to be successful. Sir Henry Littlejohn was famous not only as a medical officer of health, but also as a medical jurist. For many years he was Professor of Forensic Medicine in the University of Edinburgh, and adviser of the Crown in criminal cases.

Sir Henry Littlejohn was always at work. If he was not toiling with his hands, his mind

witness-box, lecture hall, or at the examination-table. He could be as docile as a lamb, or as firm as a rock. He was dramatic to a degree, but that was a valuable asset in his strenuous life.

He was loved by his students, and respected wherever he went. To have Sir Henry Littlejohn as a friend was to possess a friend indeed, and many pages could be filled in support of the gracious acts he has performed.

The success of his students in every corner of the globe must always be the best testimony to Sir Henry Littlejohn's greatness. Well might he have declared *Si monumentum requiris circumspice*.

REMARKS ON SOME PUBLIC HEALTH PROBLEMS OF THE IMMEDIATE FUTURE.*

By J. M. COWIE, M.D., D.P.H.,
Medical Officer of Health, Burton-on-Trent.

MY first duty is to tender my sincere thanks to the members of this Branch for the honour they have done me in electing me President of this Branch. It is a distinction which I appreciate highly, and it shall be my earnest purpose to do all in my power to further the interests of this Branch and of the Society as a whole.

I need not enter into the initial difficulties of my office in selecting a subject for my address to-day, but I may say in brief that these difficulties have been no less than appear to be customary on such occasions.

After mature consideration I came to the decision that a short address on what I consider to be some of the public health problems of the immediate future would be of interest to the members.

But before going into it more particularly, I should like to say I have no intention of dealing exhaustively with so large a subject, but intend to confine myself to some matters which in all probability will have to be dealt with at no distant date.

Tuberculosis.—The first subject on which I wish to pass a few remarks is that of tuberculosis. The National Insurance Act gave a decided stimulus to the national campaign against tuberculosis, and although it should be remembered that many authorities had, for some years been giving more and more attention to the subject, the direct attack from a national standpoint dated from the commencement of that Act. Whatever views we may hold on the efficiency of this recent attack, I think even the most pessimistic of us will admit that some benefit will accrue in checking the spread of the disease and reducing its mortality, although we may not agree with those enthusiasts who claim that the disease will be extinct in twenty years. However great this benefit may be, it should not be forgotten that there has been a decided and continuous decrease in the death-rate from this disease for many years, and that in our recent enthusiasm for direct attack we should not forget that a continuance of those measures which have been of so great benefit in the past will have the same beneficial effect in the future,

* Presidential address read before the Midland Branch on October 1st, 1914.

as there is no evidence that their powers for good in this respect have been exhausted.

While many factors have had their share in the diminished mortality from tuberculosis, I think there can be no doubt that the better housing of the people is one of the chief, giving as it does not only more air space and other conditions necessary for an effective resisting power, but also less frequent and less intimate opportunities for infection.

Few of us, I think, will admit that housing has reached that degree of perfection on which no improvement can be made, or even that in many instances it is other than very unsatisfactory, and that being so, it seems a fairly certain proposition that as the improvement in housing continues, so will the mortality from phthisis decline. I should like to emphasise, therefore, that unless we can secure a considerable improvement in the housing of the people and a rise in the standard of housing the recent measures put into force against tuberculosis will in effect be largely nullified, and I regard this question as one of the problems of the immediate future.

Closely allied to this question of housing is that of isolation of the patient, and the separation of careless infected persons from other members of the family. This still remains largely a question to be dealt with.

While a large number of early cases are now being treated and trained in sanatoria and a smaller proportion of advanced cases removed to hospitals, there is so far no compulsory powers to compel the segregation of careless and dangerous cases. Whether in some instances it might not be better to remove the susceptible children from such a house and board them out until the danger is past is worthy of consideration, but it is certain that more will have to be done to compel those who have no regard for the risk that others run, to realise their responsibilities to the community.

Evidence becomes more and more convincing, especially by work done in Edinburgh by Drs. Mitchell and Fraser, that infection derived from a bovine source is largely responsible for non-pulmonary or surgical tuberculosis. The elimination of affected animals from herds of cattle, and especially from dairy herds, is little more than begun, although there is great hope that in the immediate future substantial progress in this direction will be made under the powers of the new Milk and Dairies Act, and also, when again put in force, of the Tuberculosis in Animals Order of 1914.

Arrangements for the administration of the Milk and Dairies Act, 1914, will soon have to be made by local authorities, and it should be remembered that on the thoroughness and efficiency of these arrangements will depend in a great measure, the progress made in the stamping out of non-pulmonary tuberculosis.

Infantile Mortality.—A considerable decrease has already been effected in the number of deaths of infants, but whatever standard we may have set ourselves as desirous of attainment, we cannot say that the lowest possible rate is anywhere near realisation. In this respect I might draw your attention to an analysis made in Brighton by Dr. Duncan Forbes of the rates of infantile mortality according to social standing. He placed the streets of Brighton in four groups as follows:—Group 1, the poorest families; Group 2, unskilled workers and their families; Group 3, artisans; Group 4, the remainder of the population, including the families of the well-to-do. All the deaths of infants for a period of 12 years were so classified (the illegitimate children being placed in a group by themselves), when it was found that the rate in Group 1 was 144; in Group 2, 110; in Group 3, 88; and in Group 4, 67.

It will be seen, therefore, that even if we allow that the rate for the best streets is the best possible, the other three groups are a long way off that standard, and that a large amount of most difficult work remains to be done.

Closely allied to this question, and also to that of tuberculosis, and to practically all public health problems is that of poverty and all that is endured by the victims of poverty. A rise in the wages of the lowest paid worker would be a considerable factor in assisting public authorities in their efforts towards a reduction of infantile mortality, the more especially if the ignorance which frequently accompanies poverty could be dispelled and more enlightenment on the subject of the purchase of the most suitable and cheapest foods could be spread abroad, and the great waste in the abuse of alcohol could be avoided.

The maternity benefit paid through the National Insurance Act is no doubt of some assistance in this respect.

It appears that local authorities and voluntary agencies are now to receive financial aid in the shape of Government grants towards the expenditure incurred in respect of institutions or other provision for maternity and child welfare. These are to be distributed by the Local Government Board, while the Board

of Education will make grants to schools for mothers. In practice it seems likely that there will be considerable difficulty in distinguishing between baby clinics and schools for mothers, and that the giving of power to two Government Departments to give grants to institutions which are working on similar lines and which have the same desires and the same objects in view is an initial mistake, and that, if grants are to be given, they should be controlled by one Department.

I should like to say a few words here on the question of grants from the central authority in aid of the local authority in the carrying out of its public health duties. Grants are now being given for tuberculosis, for tuberculosis in animals, and for infantile mortality, mental deficiency, and some other matters, the usual plan being for the Government to pay one-half the cost and the local authority the other half. It seems probable that this system of grants may develop further in the future. In so far as public health is of national as well as local concern it appears reasonable that such grants should be paid, but there is one danger that I apprehend, and which I think deserves some attention.

Grants from Government will not be paid without inspection from officers sent down for the purpose, and to reasonable inspection no one will object; but I am just a little afraid that in time local authorities will be completely dominated by Government Departments, and will have no freedom of action or freedom of developing schemes along lines which appear to them best fitted for local requirements, but will have to tamely submit to whatever may be dictated from headquarters in order not to lose the grant. In fact, they will be mere figure-heads with no real power of initiative. This has practically come to pass already so far as Education Committees are concerned, and it is not at all unlikely that the giving of Government grants will in time reduce public health authorities to the same degree of powerlessness. It is to be hoped that something will be done to enable these grants to be given on a reasonable basis, so that local authorities may retain their independence in a large measure together with adequate safeguards of efficiency.

Mental Deficiency.—Local authorities are at present engaged in making arrangements for dealing with the provisions of the Mental Deficiency Act. In the past a great deal has

been done by local authorities for the prevention of bodily disease, but this Act, comprising, as it does, powers for the segregation of the mentally deficient under certain circumstances, may be regarded as the first national attempt made towards the prevention of mental disease. We have been concerned in the past in providing opportunities for the development of healthy bodies, but these are of no value without the control of a healthy brain, and it is therefore incumbent on all local authorities to make the best arrangements possible for dealing with the provisions of this Act.

Involving, as it does, the provision of accommodation and other arrangements for a great variety of cases requiring special treatment, the problem is not an easy one, but its relative importance will insure that the necessary consideration and care are given to it.

Venereal Diseases.—Another subject very closely related to the prevention of mental defect is that of venereal diseases. Although I am by no means convinced that these diseases are so prevalent as some would assert, they are by far too common, and however unsavoury the subject may be some steps will have to be taken to check their ravages. I am not an advocate of notification—at least, not in its fullest sense—but some powers will have to be obtained whereby certain cases at least must undergo a thorough cure before an opportunity is given to infect others, involving in the worst cases if need, forcible segregation, and detention. I will not attempt to forecast the recommendations of the Royal Commission on Venereal Diseases, but it is fairly certain that the control of these diseases will have to be faced at an early date, and in all probability local authorities may have fresh duties placed upon them, at least, in so far as to provide bacteriological methods of diagnosis free of cost.

Cancer.—The branch of the medical profession to which we belong has been concerned in the past to a large extent in the prevention of disease, and more especially infectious disease, but there appears no reason why we should not extend our activities by seeking to prevent death from diseases already established, and not necessarily infectious by more direct measures than have been generally adopted. In this connection I regard the action recently taken by Portsmouth with regard to cancer as an important new development. Whether cancer is actually increasing or not I am not prepared to discuss here, but it causes annually

a very large number of deaths, amounting in England and Wales in 1911 to 35,902, as recorded by the Registrar-General, or nearly one in every 1,000 of the population, a very alarming figure.

A large amount of excellent work on the subject of cancer has been done in recent years by many observers, especially by those working under the Imperial Cancer Research Fund, but the cause of the disease still remains a hidden one, and this being so we cannot suggest any reliable method for its prevention.

However, Mr. Childe, vice-chairman of the Portsmouth Health Committee and senior surgeon to the Royal Hospital, suggested to the committee that they should adopt measures for teaching the public the earlier signs of cancer, so that persons suffering from the disease might have a much better chance of cure by operative measures taken at an early stage of the disease.

The Portsmouth scheme as detailed by Dr. Mearns Fraser is as follows:—"It is to dispel the ignorance of the public on two points, viz., ignorance of the significance of the early symptoms; and, secondly, ignorance that cancer in its earlier stages is a curable disease. All the available evidence goes to show that cancer is at first a local disease, and in the majority of positions in which it occurs may be removed, and if removed early will not recur. We wish, therefore, to make the individual members of the public aware of the vital importance of at once consulting a doctor if after the age of 40 certain symptoms should appear, to point out to them what these symptoms are which should arouse suspicion of cancer, to impress on them the fact that taken early cancer is curable, and to warn of the fatal results of delay."

To accomplish this, lectures have been given to midwives and social workers, leaflets are issued to the public and notices are periodically inserted in the local press, and materials taken from any morbid growths are examined by a competent pathologist free of charge.

I give the above as a good example of what may be done towards the prevention of death from diseases already established, and this action by Portsmouth against cancer might well be followed with advantage by other local authorities. There are, no doubt, other diseases against which similar action might be taken.

War Dangers.—Engaged, as we are, in a vast European War, there are extra dangers to which the public health is exposed.

There are many refugees flocking to the protection of our shores, and it is highly probable that diseases from which we have long been free, such as cholera, may be introduced, and other diseases, such as typhoid and smallpox, may also gain a foothold. With such dangers we must be prepared to deal.

So long as our Fleet commands the sea it is unlikely that there will be any real shortage of food; but if there should be, it would be a problem for the Health Department to solve how best to get over the difficulty, and to give advice on the best foods to buy, so as to get the most nutritive value at the cheapest cost.

There are, no doubt, several other subjects which might be classed as public health problems of the immediate future, but these I have dealt with are sufficient to show that health officers are likely to be kept busy dealing with many problems of vast importance to the general welfare of the community.

INFANT MORTALITY.

(FROM A CORRESPONDENT.)

AT the National Conference on Infant Mortality, held in Liverpool in July, a number of interesting papers were read. I desire to touch upon one question related to infant mortality which appears to me to deserve more consideration than it has hitherto received. This question is whether infant mortality is a class mortality. Dr. Robertson, of Birmingham, in a very valuable paper which he contributed to the Conference, states definitely that infant mortality is a class mortality, and he exhibited a map of the city of Birmingham which showed that the mortality in the central areas is considerably more than double what it is in the suburbs. He stated that he felt sure that the main causes of the differences he indicated are not that the housing conditions are much worse, nor the conditions of poverty greater, or that drunkenness and vice are more prevalent in the slum areas, but that the mothers in these areas suffer from a greater ignorance as to what constitutes healthy and reasonable conditions for their babies than do the mothers in the suburban ring. To guard against misapprehension, he admits that housing, poverty, drink and vice do play an important part in the production of infant mortality, but not the most important part.

Another paper, by Dr. H. W. Porter, attributes the higher mortality among the slum-born infants to poverty of the parents. He does not ignore other factors in the problem, such as ignorance, carelessness, environment, etc., but he finds that where the fathers' weekly wages are under £1 the mortality is much higher than among infants whose fathers' wages are over that amount; and

that in both classes of infants the mortality is considerably less among those entirely breast-fed than among those who are partially or wholly hand-fed. He also points to variations in the mother's milk, dependent upon her feeding, and to corresponding variations in the increase in the infant's weight.

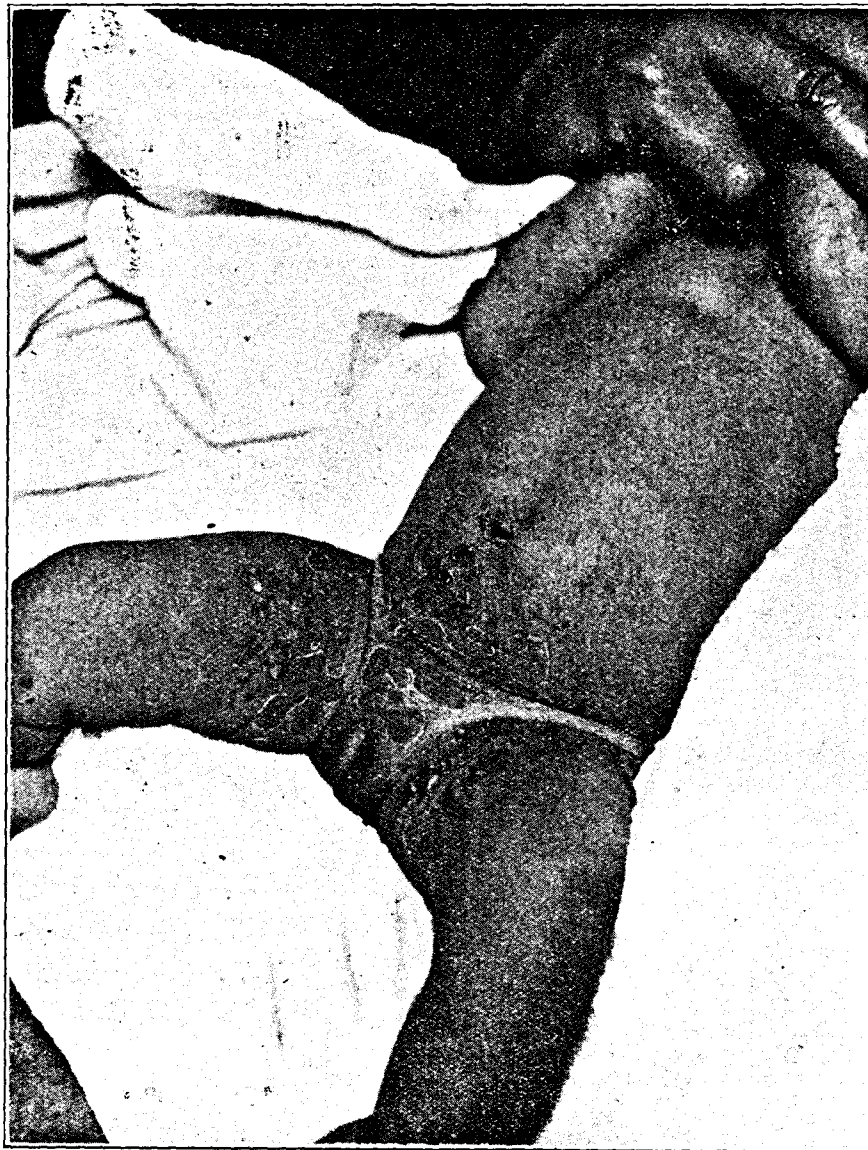
It would appear that a high infant mortality is associated with a wide group of conditions—poverty, insufficient or inappropriate food, parental neglect and ignorance—in fact, all the conditions which are found in the degraded section of the population. The high death-rates observed among infants in this class of the population are found also among those of older age in the same class. The maladies from which this class of the population dies are multiple; indeed, at the moment, I do not recollect any disease except cancer which does not show excess. Dr. Robertson included in his paper a table compiled from the Registrar-General's report of last year, which shows the marked excess of deaths from "all causes," tubercle and diarrhoea and enteritis among persons of the labouring class as compared with the mortality among persons of the professional class. Is it not, then, a fair inference that "class" very much determines the power of resistance to disease, practically of all kinds? Of course if any of the particular conditions mentioned above were improved, especially that which relates to food, some benefit would result, but is it not inherent in this class, even if their infants were transported to good homes, that their young should have a higher mortality than those of parents of the class which Dr. Robertson points to as having a low rate of mortality? In the matter of diarrhoea and enteritis it is very probable that it will be found to be due to inability during hot weather to resist the results of the growth of an organism or of organisms which are normal inhabitants of the human body. This lack of resistance is likely enough an inherited condition, associated with paucity of powers, intellectual and physical, which have raised the other class in the social scale. In one respect the class with high death-rates has an advantage, and that is in their high birth-rate, for the two always go together, as if Nature were endeavouring to compensate for the loss which they suffer in the matter of mortality.

What I have written is no doubt in the mind of many, and I should not have proposed to refer to this subject now had I not found that at a National Conference on Infant Mortality these considerations are not mentioned. For my part the question of inherited lack of resistance to disease is probably as potent a cause of the death of infants as the factors which were under discussion at the Conference of last July. Like Dr. Robertson and Dr. Porter I would not propose to ignore other factors, but my own impression is that underlying class mortality from diseases of all kinds is that of inherited lack of power of resistance.

THE SPREAD OF PEMPHIGUS NEONATORUM BY MIDWIVES.

By JOHN ROBERTSON, M.D.,
Medical Officer of Health, Birmingham.

FIVE outbreaks of this disease have occurred in the practice of midwives in Birmingham during the past eight years. Some of these outbreaks have been of a virulent type, causing



in one case five deaths out of 13 children infected, while in other instances every one of the cases appeared to be mild in type and not liable to take on septic infection. All the outbreaks occurred in the practice of midwives who had had no training. In several cases the midwife was considered to be clean and capable, so far as such a description can be applied to any untrained woman.

The fact that pemphigus neonatorum is spread by midwives is not as clearly stated in most of our text books as, I think, it ought to be, and in a good many instances there appears to be confusion, both as to the nature of the disease and the way in which it is spread. The disease appears undoubtedly to be an infantile form of impetigo contagiosa. It has many of the appearances and symptoms of

that disease. In several instances the disease has spread from infant to mother, or from infant to other members of the household, and quite definitely given rise to a typical impetigo contagiosa. Among a good many medical men who have seen isolated severe cases of the disease confusion has arisen with the syphilitic pemphigus which one gets in the newly born.

The disease has usually commenced from

the fourth to the tenth or twelfth day after birth, and it first appears as small bullae with clear contents, varying in size from one-eighth to one-quarter inch or more in diameter. The contents of the bullae become turbid and purulent, the bullae break and a superficial raw surface is left, which extends rapidly, particularly in the flexures, so that after a period varying from a few days to a week one gets the appearance seen in the photograph. In severe cases a suppurative dermatitis follows, with a good deal of diffuse cellulitis, enlargement of glands, abscesses, and other complications occasioning death.

In an outbreak which occurred in 1908 there were 37 infants attacked with this disease between May 28th and September 28th (four months) in the practice of one midwife, who had during this period attended 69 confinements. Two of these infants died. In one case the death was certified to be due to congenital syphilis, while in the other it was put down to cellulitis of the abdominal wall and convulsions. Among the infants suffering from the milder types of the disease efficient treatment checks its spread with great rapidity. On the other hand among dirty people the disease continues to progress for several weeks.

In the most recent outbreak of this disease 14 cases occurred in the practice of one midwife between June 1st and August 12th of this year. These cases occurred in two batches—the first between June 2nd and June 16th, when five cases occurred. The clothing of the midwife was disinfected, and there were no further cases until July 24th. It will be noted that not every baby attended by the midwife contracted the disease. In the last outbreak rather less than 25 per cent. of the children were attacked, while in the 1908 outbreak there were 54 per cent. affected.

In several instances bacteriological investigation was made into the contents of the bullae, but apart from the presence of pus organisms no specific germ was discovered.

The most important practical point in these outbreaks is as to the precise manner in which infection is spread. The midwife herself in none of the cases suffered from any disease which could be considered to be impetigo. In the Birmingham area there is probably not more impetigo than in other areas where there is a large poor-class population. In none of the outbreaks have we been able to find that the midwife has attended at a house where a case of impetigo contagiosa existed.

It is a custom for the midwife to go round every morning or every afternoon in order to attend to the mother and at the same time to wash the infant. In doing this it is the practice of the midwife to carry from house to house an apron on which she places the infant when she washes it. In other instances, I believe, the child is placed on the dress of the midwife while it is being washed without any apron being used.

There seems to be no doubt whatever that the midwife carries the infection from house to house, and that her clothing, apron, or dress is probably the source from which the infection is derived. In all instances in which we have been able to get information about such an outbreak we have been able to check its progress by having the clothing of the midwife thoroughly disinfected. We have asked as a safeguard that the midwife should use a separate apron at each house, but this is strongly objected to, as aprons left at the house by a midwife have disappeared so frequently that they do not like the suggestion. At the same time that we disinfect the midwife's clothing she is required to abandon the use of a powder pad, and to use a pepper-box for her dusting-powder instead.

APPOINTMENTS.

COL. J. R. DODD, R.A.M.C., has been appointed medical officer to take charge of ankylostomiasis work in Trinidad.

DR. W. GARSTANG has been appointed medical officer of health of Hucknall-Torkard U.D.

DR. WILLIAM NICOL WATSON KENNEDY has been appointed assistant medical officer to the Croydon Education Committee.

DR. G. S. LEVIS has been appointed temporary medical officer of health of Gainsborough U.D.

DR. HAROLD N. LITTLE has been appointed medical officer of health of Dunstable.

DR. ALEX. MATHIESON, of Falkirk, has been appointed school medical officer to the West Riding Education Committee.

DR. J. F. WALKER has been appointed temporary tuberculosis officer of Southend during the absence of Dr. W. Scarisbrick on war service.

DR. T. RUDDOCK WEST has been appointed assistant school medical officer of Norwich.

DR. C. A. WILKINSON has been appointed temporary medical officer of health of Scarborough during the absence of Dr. S. F. Linton on war service.

DR. KENRICK S. WISE, Government Medical Officer, British Guiana, has been appointed a member of the Executive Council of British Guiana.

MILITARY APPOINTMENTS.

DR. G. F. CROSS, M.O.H. Downham, to 5th Battalion Norfolk Regiment.

DR. E. S. GALBRAITH, Assist. S.M.O., City of York, now Lieutenant R.A.M.C., attached to 3rd Yorkshire Regiment.

DR. A. H. HOGARTH, Bucks County M.O.H., has been promoted from Surgeon-Lieut. to Surgeon-Captain of the Oxfordshire Yeomanry.

DR. C. E. HUMPHREYS, County M.O.H. Montgomeryshire, now Major R.A.M.C.T. with 7th Battalion Royal Welsh Fusiliers.

DR. C. B. MOSS-BLUNDELL, County M.O.H., Huntingdonshire, is attached to the Highland Mounted Brigade as Sanitary Medical Officer with rank of Captain.

DR. J. E. SANDLANDS, M.O.H., Kensington, appointed Lieutenant R.A.M.C.T., 5th London Field Ambulance.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED 1888.

INCORPORATED 1892.

REPORT OF COUNCIL, SESSION 1913-14.

ANNUAL GENERAL MEETING.

THE Annual General Meeting of the Society of Medical Officers of Health was held at the offices of the Society, No. 1, Upper Montague Street, Russell Square, London, W.C., on Friday, October 16th, 1914, at 5 p.m.

Present:—Dr. A. K. Chalmers (in the chair), Dr. Herbert Jones (President-elect), and Drs. A. B. McMaster, J. B. Wilkinson, H. Beale Collins, A. A. Mussen, A. Stalker, A. T. Nankivell, W. J. Howarth, J. Tubb-Thomson, Thos. Strain, S. C. Lawrence, G. E. Oates, G. F. Buchan, A. G. R. Cameron, William Butler, A. Bostock Hill, H. Meredith Richards, R. H. Wilshaw, R. A. Lyster, Percy W. Spaul, W. Benton, H. Handford, J. M. Cowie, T. Orr, T. Shadick Higgins, E. H. Snell, A. Oswald, C. Sanders, T. Ridley Bailey, T. W. N. Barlow, W. S. Stalker, H. O. Williams, and R. Veitch Clark.

INDUCTION OF THE NEW PRESIDENT.

In inducting Dr. Herbert Jones as President of the Society for Session 1914-15, Dr. CHALMERS, the retiring President, said that it was unnecessary for him to emphasize the virtues possessed by his successor. The members were well aware of the many years of devoted service that Dr. Herbert Jones had dedicated to the Society as one of its honorary secretaries, which valuable work alone entitled him to the honor of occupying the presidential chair. As retiring President he took the opportunity of expressing his own personal thanks to Dr. Herbert Jones for the invaluable assistance rendered to him during his year of office. Dr. Chalmers then invested Dr. Herbert Jones with the Society's badge of office amidst applause and vacated the chair. The new President then took the chair.

Minutes.—The minutes of the last Annual General Meeting, held on October 17th, 1913, and published in PUBLIC HEALTH for November, 1913, at p. 62, were taken as read.

Dr. WM. BUTLER, in moving a hearty vote of thanks to the retiring President, alluded to the valuable services rendered by Dr. Chalmers during a successful year of office, when many matters of extreme importance to members of the Society had been satisfactorily dealt with.

Dr. A. BOSTOCK HILL, in seconding the vote, said that the Society was much indebted to Dr. Chalmers for his year of work. He had not only fully maintained the dignity of the office, but had given much time and labour to the problems which

had come before the Council during the past Session.

Dr. HERBERT JONES, the President, said that before putting the resolution to the meeting he desired to express his own personal appreciation of the valuable services of Dr. Chalmers, to whom were due the remarkably successful series of discussions which the Society had at its meetings during the previous Session.

The PRESIDENT then put the resolution, "That a hearty vote of thanks be accorded to the retiring President, Dr. A. K. Chalmers, for the valuable services rendered to the Society by him during his year of office," and it was carried unanimously with acclamation.

Dr. CHALMERS expressed his sincere thanks for the resolution and the kind manner in which it had been received.

Correspondence.—A number of letters were reported from members regretting their inability to be present.

The following Annual Reports were received:—

(a) The Council (published in the October number of PUBLIC HEALTH).

(b) Report of the Hon. Treasurer—

GENTLEMEN,—In submitting the Balance Sheet and Accounts for Session 1913-14, I have much pleasure in reporting that the finances of the Society are in a satisfactory condition, and that during the Session a further sum of £50 was invested in Consols to the credit of the Reserve Fund for Dilapidations and Depreciation. This fund now consists of Consols to the extent of £320 16s. 7d. There is also a cash balance of £5 3s. 7d., which has been carried forward to the new Session.

A comparison of the Revenue Account with that for Session 1912-13 shows a decrease in most of the items of general expenditure. Subscriptions received show an increase of £62 16s. 3d. over the amount paid in during Session 1912-13. In other respects the financial year has been a normal one.

In view of the war steps have already been taken to further reduce expenditure, and I look forward with confidence to an equally satisfactory balance sheet at the end of Session 1914-15.

I am, Gentlemen,

Yours faithfully,

CHAS. SANDERS,

Hon. Treasurer.

(c) The Editor (published in the October number of PUBLIC HEALTH).

(d) The Hon. Librarian (published in the October number of PUBLIC HEALTH).

(e) The Auditor's Report, together with the accounts and balance-sheet.

Election of Auditor.—On the motion of Dr. SANDERS, seconded by Dr. A. BOSTOCK HILL, it was resolved that Mr. H. J. Sharpe, chartered accountant, of 1, Queen Victoria Street, E.C., be and is hereby reappointed auditor of the Society at the same remuneration as before for Session 1914-1915.

Election of Honorary Fellows.—Referring to the nominations by the Council to the Honorary Fellowship of the Society, the PRESIDENT reminded the meeting that in the case of Dr. Edward Seaton he had a strong claim to the Honorary Fellowship of the Society, having been a member of the Council for many years, in addition to which he was the second President of the Home Counties Branch, and was President of the Society in 1897. With regard to Sir Arthur Whitelegge they were all familiar with the great services rendered by him to public health, and it was interesting to note that years ago he succeeded Dr. Seaton as medical officer of health for Nottingham. On the motion of Dr. Sanders it was resolved unanimously that the President do ballot on behalf of the Society for the election to the Honorary Fellowship of the Society of Sir Arthur Whitelegge, K.C.B., and Edward C. Seaton, M.D., F.R.C.P. The President having voted he declared them to be duly elected Honorary Fellows of the Society.

Election of Fellows.—The following candidates who had been duly nominated were balloted for, and were declared by the President to be duly elected, viz.:—

BRIDGE, JOHN C., F.R.C.S. (Ed.), D.P.H., 72, Bridge Street, Manchester; GAMLEN, ROBERT L., M.A., M.D., D.P.H., Charlton House, Dawlish, Devon; GRAHAM, JOHN H. PORTEOUS, M.R.C.S., L.R.C.P., Monmouth, Wallasey, Cheshire, Tuberculosis Officer, Welsh National Memorial; GRAHAME, M. C. R., M.B., Ch.B., D.P.H., Lieut. R.A.M.C. Mess, McGrigor Barracks, Aldershot; HUTTON, MALCOLM, M.A., M.B., D.P.H., 15, Manchester Road, Shaw, Oldham; LEIGH, GEORGE H., M.D., D.P.H., 22, Rodney Street, Wigan; MELL, F. O. N., M.B., C.M., D.P.H.; VALENTINE, JESSIE M., M.B., Ch.B., B.Sc.

Presentation of Portrait of Dr. E. W. Hope by the North-Western Branch.—Dr. A. A. MUSEN, President of the North-Western Branch, said that the pleasant duty devolved upon him, on behalf of the North-Western Branch, to ask the Society to accept a portrait of Dr. E. W. Hope, a former President of the Society, to be included in the Society's collection. It was a matter of great pride to the North-Western Branch that they had provided two Presidents of the Society in recent years, and he felt sure that the Society would welcome the addition of a portrait of Dr. Hope, who had fully maintained the dignity of the chair.

THE PRESIDENT (Dr. Herbert Jones) said that it was a source of great pleasure to him that one of the first duties he had to perform was to receive the portrait of Dr. E. W. Hope from the North-Western Branch. It was the more gratifying to him, personally, as the North-Western Branch was his mother Branch, and his (the President's)

earliest duties in the Public Health Service were associated with that Branch and Dr. Hope. He had great pleasure in accepting the portrait on behalf of the Society.

The President then delivered his Presidential address upon "The Public Health Service and the National Crisis."

On the motion of Dr. MEREDITH RICHARDS, seconded by Dr. T. RIDLEY BAILEY, a hearty vote of thanks to the President for his illuminating address was carried by acclamation.

THE PRESIDENT having expressed his thanks for the resolution the proceedings terminated.

Home Counties Branch.—The first meeting of the session was held at the Society's rooms, Russell Square, at 4 p.m. on 15th October, 1914. Mr. A. G. R. Foulerton, retiring President, took the chair, and the minutes of the last meeting were read and approved.

Mr. Foulerton, retiring President, then, with wishes for a successful year of office inducted the new President, Dr. S. C. Lawrence in the chair, and in so doing expressed his gratitude for the assistance rendered by the retiring Hon. Secretary and others.

Dr. Lawrence before proceeding with the next business, proposed a vote of thanks to the retiring officers, this was carried *nem. con.* Dr. Foulerton and Beale Collins responded.

The following members were present:—Drs. Linton, Tew, Veitch Clark, Clements, Haldane Cook, A. E. Porter, J. J. Clark, Sanders, Warren, Oswald, Gruggen, Collins, Goddard, Strain. Dr. Kenwood was present as a visitor.

Apologies for absence were read from Drs. Buchan, Greenwood, St. Clair, Shadwell, and Thresh.

Correspondence read included letters on "The Health Week," on a reference from the Finance Sub-Committee to the Branch on the question of Building Bye-laws, etc.

The Hon. Sec. made a statement that Dr. J. J. Paterson, a member of the Branch was a prisoner of war in Germany, and that the following members of the Branch were engaged with His Majesty's Forces:—Drs. Greenwood, Freemantle, Dundas, Barrett Higgs, Brebner, Castell, Steegman, Rock, Butler-Harris, Johnston, Goddard, Allison.

The President, Dr. Lawrence, then gave his Presidential address on "The Annals of the Home Counties Branch, 1894-1909. Giving in a pleasant and interesting way the history of the work and growth of the Branch.

On the invitation of the President the following original members of the Branch gave reminiscences of the work of the Branch, and expressed appreciation of the address:—Drs. Gruggen, Sanders, Tew, and Kenwood.

Midland Branch.—A meeting was held on Thursday, October 1st, 1914, at 3.30 p.m., at the Council House, Birmingham.

Present: Dr. A. Bostock Hill (in the chair). Drs. J. Doig McCrindle, Henry Malet, T. Ridley Bailey, W. M. Clendinnen, H. Gibbons Ward, E. S. Robinson, J. Orton, J. M. Cowie, Howard Wilkinson, and E. H. Snell. Apologies for absence were received from Drs. Henry May, Handford, Robertson, Petgrave Johnson, Dryburgh Gold, and Mabyrn Read.

Dr. J. M. Cowie was inducted to the chair, when, after thanking the Branch for his election, he proposed a hearty vote of thanks to Dr. Petgrave Johnson for his services to the Branch as President during the past year. This was unanimously carried.

The minutes of the last meeting were confirmed.

Dr. Bostock Hill presented the Treasurer's report for the year. This was received and adopted.

It was unanimously resolved that a subscription of ten guineas should be paid from the funds of the Branch to the Prince of Wales Fund.

The President then gave an address on "Remarks on Some Public Health Problems of the Immediate Future." Dr. Malet then proposed a vote of thanks to the President for his interesting address, which was seconded by Dr. McCrindle, and supported by Drs. Bostock Hill, Clendinnen, Snell, and Orton.

Dr. Cowie briefly replied.

LAW REPORTS.

HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.

May 2nd, 1914.

BEFORE DARLING, AVORY, AND ROWLAT, JJ.
HOPE v. DEVANEY.

Liverpool Corporation Act, 1913—Verminous Child—Validity of Service of Notice.

This was a case stated by the stipendiary magistrate for Liverpool, and raised a question as to whether a notice to a parent to cleanse a child had been properly served within the meaning of sect. 35 of the Liverpool Corporation Act, 1913. Under that section school children may be examined by the medical officer, and if a child is found in a verminous or filthy condition notice may be served on the parent or guardian of the child requiring him to cleanse the child within 24 hours. If this is not done, then the medical officer may have the child removed and cleansed. If after this is done the child is again allowed to get into a filthy condition, the same procedure

may be followed, but the parent or guardian then becomes liable to a penalty of 10s.

It is also provided that any notice under sect. 35 "shall be deemed to be properly served by giving it to the person to whom it is addressed or leaving it for him with some inmate of his residence, or by sending the same by post in a registered letter to his usual or last known address."

The question in dispute was as to whether the notice was properly served under the following circumstances.

The child, whose age was 13 years, lived with her father and mother. On November 11th, 1913, she was found at school in a filthy condition. About 2.30 p.m. on November 13th notice was served on the father to cleanse the child, and on the following day about 2.30 the child, being still in a filthy condition, was removed and cleansed. On November 21st the child was again found in a filthy condition, and proceedings were again taken to have the child cleansed, and also for a penalty against the father. It was then contended that these proceedings were invalid, because the first notice was not properly served. The notice had been left at the house of the father at 2.30, and was then given to the child herself, who was the only occupant of the house at the time. Her father was at work, and did not return until his usual time, which was 5.30.

It was said on behalf of the father that service by giving it to the child was not valid, and further that, as the father would not in the ordinary course receive it before 5.30, the 24 hours' notice required by the Act was not given.

The magistrate dismissed the summons, holding that service on the child was not sufficient, and that the respondent had never received the notice. He also held that if the father did receive it constructively, he had not been given 24 hours' notice.

The Court allowed the appeal.

DARLING, J., said that at the time the notice arrived at the house the child was the sole inmate of the house, and was capable of receiving notice on her parent's behalf. She would have taken in any letter or article brought to the house, and there was nothing in the Statute to say that the inmate of the house was not to be the verminous child. As to the other point, the receipt of the notice must be deemed to be the time when it was served. Had it been sent by post it would have been deemed to have been served at the time when in the ordinary course of post it would probably have been delivered. No duty was cast on the local authority to show when the notice was actually received by the person to whom it was addressed.

KING'S BENCH DIVISION.

October 14th, 1914.

BEFORE COLERIDGE, HORRIDGE, & SHEARMAN, JJ.
Re the Housing, Town-Planning, etc., Act, 1909, and re Lancaster and the Mayor of Burnley.

Housing Acts, 1909—Closing Order—Duty to Make Demolition Order—Power of Local Government Board on Appeal—Dwelling-houses Connected with Warehouses.

On an appeal to the Local Government Board to quash a demolition order made under sect. 18 of the Housing, Town-Planning, etc., Act, 1909, the Board may on equitable grounds quash or vary such order, although the local authority were bound by the section to make the order.

This was a case stated by the Local Government Board, for the opinion of the High Court on a question of law arising on an appeal against a demolition order.

The Corporation of Burnley made a closing order in respect of certain dwelling-houses, which closing order became operative in October, 1912. The premises were subsequently bought by the appellant Lancaster, who proceeded to convert them into warehouses, and it was said that they could not be used as dwelling-houses. The Corporation of Burnley, acting under sect. 18 of the Housing, Town-Planning, etc., Act, 1909, being of opinion that the houses had not been rendered fit for human habitation, made an order for their demolition, as the Corporation is required to do by sect. 18 (2) of the Act. Against this order Lancaster appealed, and at a local inquiry he contended that the power to make a demolition order only applied to a house capable of being used as a house at the time the order was made; but that even if the local authority were bound to make the order, the Local Government Board had power to quash it under sect. 39, which empowers the Board "on any such appeal to make such order in the matter as they deem equitable."

The local authority contended that the Local Government Board's jurisdiction was limited to deciding whether the Corporation had exercised its powers properly, and could not make any order which the Corporation could not have made.

The Local Government Board, before giving their decision, stated this case, asking whether, notwithstanding that the local authority might be bound to make the demolition order, the Board had power to quash, vary, or make such other order as the Board thought equitable.

The Court were of opinion that the Board could quash or alter the order.

COLERIDGE, J., said that, if sect. 18 was not complied with, the local authority had no discretion, but were bound to make the demolition order. If this created a hardship, the remedy was by appeal, and the Act expressly gave the Board power on appeal to make such order as appeared reasonable.

LIST OF BELGIAN WOUNDED.

AT the request of the Military Superintendent at the London Hospital a list of Belgian wounded soldiers under treatment in that Institution is published in the present number on pages ii. and iii. Medical officers of health in touch with Belgian refugees in any part of the kingdom are earnestly requested to bring the list to their notice, in order that they may be able to put themselves in communication with their wounded relatives. In the case of refugees without means a small fund is available for the payment of the travelling expenses of refugees desirous of visiting their wounded relatives, but application should first be made to Miss Ethel Jordan, secretary, at the Military Superintendent's Office, London Hospital, Whitechapel, E.

Copy of Letter sent to all Medical Officers in the 1st London Division, on September 30th, 1914:—

TO THE MEDICAL OFFICER.

TREATMENT FOR DESTRUCTION OF VERMIN.

UNTIL more complete arrangements can be made, medical officers will adopt the following method as far as possible:—

Arrangements should be made for the bathing of affected individuals and other inmates of infected tents.

After drying themselves, men to lather their bodies with cresol soap solution,* especially over hairy parts, and allow the lather to dry on.

Shirts to be washed in cresol soap solution made with boiling water.

Tunics and trousers to be turned inside out, and rubbed with same lather, especially along the seams. Lather to be allowed to dry on garment.

Blankets to be exposed to sunlight on every opportunity.

S. M. COPEMAN,

Lieut.-Colonel,

Divisional Sanitary Officer,

1st London Division.

* Water, 10 gals.; Jeyes' Fluid, 12oz.; soft soap, 12lbs. Materials can be obtained by requisition on Orderly Sergeant, Detention Hospital, St. John's Schools, Crowborough.

RECENT PUBLIC HEALTH LITERATURE.

Alcoholism.

MAUS (L. M.). Injurious effects from the moderate use of alcohol. *Med. Temperance Review*, 1914, xvii, 101.—WILLIAMS (E. H.). Inebriety as a medical problem. *Post Graduate*, N.Y., 1914, xxxix, 603.—COOPER (J. W. A.). Proposed legislation for inebriates. *Brit. Journ. Inebriety*, 1914, xii, 59.—NEILD (T.). Chronic alcoholism and reproduction. *Brit. Journ. Inebriety*, 1914, xii, 71.—SHAW (T. C.). The alcohol problem of to-day. *Brit. Journ. Inebriety*, 1914, xii, 66.—WAITE (R.). Drink in relation to the Poor Law. *Brit. Journ. Inebriety*, 1914, xii, 78.

Animals, Disease of.

BOISMOREAU (E.). The transmission of foot and mouth disease to man. *Med. Press*, 1914, ii, 170.

Bacteria.

DELÉPINE (S.) and GREENWOOD (A.). The action of some metals upon certain water and other bacteria. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 317.—ROGERS (L. A.), CLARK (W. M.) and EVANS (A. C.). The characteristics of bacteria of the colon type found in bovine feces. *Journ. Infect. Dis.*, 1914, xv, 99.—VAILLARD (L.). "Germ carriers" from a public health point of view. *Journ. State Med.*, 1914, xxii, 449.

Blood.

MYERS (V. C.). Chemical composition of the blood in health and disease. *Post Graduate*, N.Y., 1914, xxix, 505.

Cancer.

BROWN (J. W.) and MOHAN (L.). An inquiry into the relation between social status and cancer mortality. *Journ. of Hygiene*, 1914, xiv, 186.—WOOD (A. C.). On the prevention of cancer. *New York Med. Journ.*, 1914, c, 122.

Cheese.

EVANS (A. C.) and HASTINGS (E. G.). A study of the bacteria concerned in the production of the characteristic flavour in cheese of the Cheddar type. *Science*, 1914, xxxix, 800.

Children, Care of.

MACKENZIE (W. L.). Discussion on the duty of the State towards the early environment of the child. *Brit. Med. Journ.*, 1914, ii, 321.—ROTH (R. E.). School postures and spinal deformities. *Australas. Med. Gaz.*, 1914, xxxv, 521.—CAMPBELL (Miss J.). The teaching of infant care and management to girls in public elementary schools. *Pediatrics*, N.Y., 1914, xxvi, 418.

Climate.

TAYLOR (F. H.) and YOUNG (W. J.). The coastal climate of tropical Queensland. *Journ. Trop. Med.*, 1914, xvii, 225.

Dairy Inspection.

KLEIN (L. A.) and CAMPBELL (H. C.). Use of the fermentation test in dairy inspection. *Proc. Path. Socy. Phila.*, 1914, xvi, 30.

Deaf.

BURTON (G. C.). The deaf child and his education. *Cleveland Med. Journ.*, 1914, xiii, 485.

Dental Caries.

DON (J.). Lead in water in relation to caries and the detection of minute quantities. *Dental Record*, 1914, xxxiv, 509.

Diarrhoea.

MANDEL (L.). Summer diarrhoea: a résumé of the recent work done on its etiology and bacteriology, etc. *Practitioner*, 1914, xciii, 390.

Diphtheria.

MILLER (H. R.). A preliminary report on a method of treatment for diphtheria carriers. *Med. Record*, N.Y., 1914, lxxxvi, 158.

Disinfectants.

TULLY (E. J.). A study of calcium hypochlorite as a disinfectant of water. *Amer. Journ. Pub. Health*, 1914, iv, 423.

Disinfection.

DALE (J.) and HIGGINS (T. S.). Disinfection with current steam and formaldehyde vapour under reduced pressure. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 392.

Drainage.

RACE (A.). House drainage: Some observations on the Barrow-in-Furness system. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 413.

Dust.

CRAMPTON (C. W.). Prevention of school-room disease and dust. *Med. Recorder*, N.Y., 1914, lxxxvi, 331.

Education.

GREELEY (H.). Public health education. *Medical Record*, N.Y., 1914, lxxxvi, 418.—McCLURE (D. E.). How shall we abate disease and crime through education? *Public Health*, Michigan, 1914, N.S. ii, 400.—PRITCHETT (H. S.). The medical school and the State. *Journ. Amer. Med. Assoc.*, 1914, lxiii, 648.

Eugenics.

McWILLIAMS (T. S.). The mating of the unfit. *Cleveland Med. Journ.*, 1914, xiii, 495.—APERT (E.). Puericulture et eugénique. *Journ. State Med.*, 1914, xxii, 620.—HOUSSAY (M. F.). Eugénique et régimes alimentaires. *Journ. State Med.*, 1914, xxii, 614.

Factory and Workshops Act.

STALKER (W. S.). The desirability for extension of the certification of fitness provisions of the Factory and Workshops Act, 1901, to all forms of juvenile employment. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 337.

Flies.

LEVY (E. C.). Modern methods of fighting the house-fly. *Amer. Journ. Pub. Health*, 1914, iv, 439.—HEWITT (C. G.). Further observations on the breeding habits and control of the house-fly, *musca domestica*. *Journ. Econom. Entomol.*, 1914, vii, 260.—MORRILL (A. W.). Experiments with house-fly baits and poisons. *Journ. Econom. Entomol.*, 1914, vii, 268.—ROSS (E. H.). House-flies and disease; the attack on the fly must be levelled at the breeding places. *Scienc. Amer. Suppl.*, N.Y., 1914, lxxvii, 322.—VAILLARD (L.). The Harber Lectures, 1914. House-flies and disease. *Journ. State Med.*, 1914, xxii, 577.

Public Health

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ANTI-TYPHOID INOCULATION.

THE importance of shielding our troops, both at home and abroad, from the disastrous effects of an outbreak of typhoid fever is so great that the advantage of giving the widest publicity to the ascertained facts relating to prophylactic inoculation will be apparent to all medical officers of health, indeed to all medical men who are in a position to influence those likely to be called to the colours. At the cost of repeating well-known conclusions, we think it may be of service to some readers if we summarise the evidence upon which those who advocate the employment of typhoid vaccines rely. In so doing we hope to avoid any of those exaggerated statements which have, in the case of other measures of prophylaxis, done harm to the cause they essayed to support.

The theoretical basis of anti-typhoid inoculation is extremely simple. For practical purposes, we may say that therapeutic measures to prevent the development of disease in persons exposed to infection fall into one of two main classes. On the one hand we may strive to introduce into the circulating liquids a substance which will directly antagonise the products of infection, or, on the other, we may employ material which, not itself antagonistic to them, stimulates the organism to manufacture protective bodies. The former is the method of passive, the latter that of active immunisation. Notable triumphs of passive immunisation are afforded by the instances of diphtheria and tetanus, but, although certain workers have claimed successful results (e.g., Meyer and Bergell*), passive immunisation against typhoid can hardly be said to possess any immediate importance. That the injection of typhoid bacilli or their products would result in the development of an active immunity was rendered *a priori* probable by (a) the old observation that a second attack of typhoid is

uncommon; (b) the discovery that the blood of laboratory animals which had received injections of typhoid bacilli contained various substances not present in measurable quantities in control animals; (c) the further discovery that similar substances occurred in the blood of sufferers from typhoid and persisted there for months after convalescence. Encouragement was also afforded by the success attending Haffkine's prophylactic inoculations of dead cultures of Koch's vibrios in the case of cholera. The first actual injections of dead typhoid bacilli into men were made independently by Sir Almroth Wright in England and Pfeiffer and Kolle in Germany*; in both investigations specific substances appeared in the blood of the subjects. Although, as we have said, these researches were independent, subsequent progress in the practical development of the subject is almost entirely due to the indefatigable energy of Sir Almroth Wright and his pupils in the British Army Medical Service.†

Since 1906, the biochemistry of the response to inoculation has been the object of unremitting study by officers of the Royal Army Medical Corps, and their results are published in the papers cited below.‡ Confining our attention to observations made upon man, we may say that the method of research was to compare the content, in respect of immune bodies of the blood of inoculated and uninoculated men using exact laboratory methods and testing conclusions by numerous repetitions of the chief experiments. The outcome of these experiments was the following:—

Agglutinins, or substances facilitating the clumping together of bacilli, bacteriocidins, or

* Wright, *Lancet* September 19th, 1896. Pfeiffer and Kolle, *Deutsche Med. Wochenschr.*, 1896, No. 46.

† See Beitrag z. aktiven Immunisierung des Menschen gegen Typhus, von R. Bassege und W. Rimpau, *Festschrift z. sechzigsten Geburtstage von Robert Koch*, Jena, 1903.

‡ *Journ. Roy. Army Medical Corps*, 1905, v, 1; 1907, viii, 472; 1908, x, 583; 1908, xi, 327. *Journ. Roy. Inst. Public Health*, xviii, July, August, September, 1910 (The Harber Lectures for 1910, by Sir William B. Leishman).

* Ueber Typhusimmunisierung. *Berlin. klin. Wochenschr.*, 1907, No. 12.

substances killing bacilli, bacteriolysins, or substances leading to the disintegration of bacilli were all formed in the blood of the inoculated subjects. In addition a thermostabile opsonin, or substance rendering the bacilli open to the attack of phagocytes was demonstrated, and the view of the inquirers was that the most important factor in the development of immunity was that favouring phagocytic action.

It was also shown that vaccines derived from virulent cultures of bacilli did not necessarily lead to the production of a higher content of immune bodies than those manufactured from cultures of low virulence.

Lastly it was shown that the temperature at which a culture is sterilised preparatory to the manufacture of a vaccine exercises an important influence upon its immunising value, the latter diminishing rapidly as the temperature of sterilisation rises; this circumstance affords an explanation of the comparatively unfavourable results in practice which have been occasionally observed in earlier trials. A large number of practical points with reference to the technic of preparing and standardising the vaccine were also elucidated, but these do not involve any question of principle and need not detain us here.

The work which we have epitomised having placed anti-typhoid inoculation upon a sound experimental basis and justified its employment in the field, we have next to turn to the question of its value in practical life. This problem can only be solved by the statistical method, since like all kindred instances it involves the study of massed results subject to individual variations. No claim is made that the process of immunisation infallibly protects against exposure to disease. Passing through an attack of typhoid does not inevitably insure the survivor against a second attack, it only greatly reduces the probability of exposure leading to infection; consequently no one would anticipate that cases of typhoid would never occur amongst immunised men, the question is whether the latter are appreciably less liable to such a misfortune than are their fellows.

To obtain satisfactory materials for forming a judgment on this matter is by no means an easy task. The desideratum is that we should have large numbers of men strictly comparable in respect of age, habits of life and occupation, only differentiated in so far that a moiety of them have been inoculated and a moiety not so treated. Further the two groups must have been exposed to the same conditions of risk during the same period of time.

These conditions have indeed never been fulfilled with meticulous precision since, in the best instance to which we shall be able to refer, the inoculated subjects were not chosen at

random, but volunteered. Evidently it might be argued that those who volunteer will be persons of more than average prudence and will be likely to take other precautions against infection. As a matter of fact, however, it is more than doubtful whether any individual precautions *within the control of a private soldier*—and our data relate exclusively to soldiers—would have any sensible effect in diminishing the risk of infection. Further, the experience of regimental officers does not point to the conclusion that volunteers for inoculation are necessarily, or even usually, more careful in their personal habits than other soldiers. Under these circumstances the failure to fulfil this one condition is of no serious moment, provided all the others have been obeyed. Such is nearly the case in the statistics compiled for the Committee appointed by the Army Council to investigate the subject of anti-typhoid inoculation. These statistics, a summary of which will be found in the Harben lectures of Sir William Leishman cited above, relate to the experience of troops proceeding to foreign stations and under the observation of medical officers who had received special instruction in the technic of inoculation and the bacteriological investigation of typhoid. Great pains were taken to render the diagnosis exact, and to furnish accurate particulars as to the time of exposure, variations in the strength of the troops, transferences from uninoculated to inoculated groups and other relevant details. In no case were commissioned officers, women or children included in the statistics. Since there may be an appreciable difference between the mean ages of the non-commissioned officers and of the privates, and since it is *a priori* probable that the large majority of the former belonged to the inoculated class, it would be better in future returns if a separate tabulation of the two classes were made. This appears to us the only important omission from the data, and its significance must not be rated too highly. Turning to the summarised results we find that among 10,378 inoculated men 56 cases of typhoid occurred, an incidence of 5.40 per thousand; among 8,936 uninoculated men there were 272 cases, giving a rate of 30.4, or more than five times as heavy. The detailed statistics show that after the regiments arrived at the foreign station there was a considerable transfer from the ranks of the uninoculated to the inoculated, and there was, of course, a marked difference between the total number of men under observation when the special medical officer joined the unit at home and that recorded when the regiments had been made up to their full establishment after arrival at the foreign stations. The figures we have quoted are those believed by the Anti-typhoid Committee to represent most accurately the state of affairs, and we have no reason to impugn their conclusion. It is, however, worth while to push our analysis a little further.

Since the number of inoculated men increased after arrival at the foreign station, it might be objected that some of those who swell the total of inoculated actually passed through the period of exposure to risk while in the uninoculated condition. The maximal difference would be made by assuming that the only inoculated persons exposed to risk as such were the 6,815 actually inoculated on arrival at the first foreign station, and to assume that the 11,668 men uninoculated at the same time remained in this condition during exposure. We should then have 56 cases of typhoid among 6,815 inoculated men and 272 among 11,668 uninoculated persons, or case rates of 8.22 and 23.31 per thousand respectively. We see that even with this, the most unfavourable possible grouping, the difference between the incidence rates is substantial, that of the uninoculated being nearly three times that of the inoculated. As in many instances the great rise in the number of the inoculated occurred very shortly after arrival at the foreign station, it is evident that the difference is now under-stated. Another possible objection to the massed figures is that in some units with a large proportion of inoculated men no cases of typhoid occurred at all in either class. For instance, in the 6th Inniskilling Dragoons, 547 men were inoculated and only 58 uninoculated, no cases occurring during the nine months of observation. It might be objected that no exposure to risk occurred and that the inclusion of the figures unfairly swells the ranks of the uninoculated. As a matter of fact, however, similar instances are given in which the proportions are reversed, e.g., the 3rd Battalion King's Royal Rifle Corps, with 711 uninoculated and 217 inoculated. Further, if we confine our comparison to units returning at least ten cases, we have 46 cases among 3,387 inoculated men and 227 among 2,656 uninoculated men; incidence rates of 13.58 and 85.47 respectively, the latter more than six times as large as the former. We think, therefore, that these statistics afford very substantial evidence in favour of the practical value of anti-typhoid inoculation. Taking the numbers accepted by the committee, the difference between the chance of an inoculated man contracting typhoid and an uninoculated man doing so is of the same order as the difference between the chance of a man aged 20 dying before the end of a year and that of a man aged 54 dying in the same period. Even were we to take the least favourable comparison, the ratio would be that of a man aged 20 with a man aged 43. In the face of this evidence some very cogent arguments would be required to discredit the case for inoculation. We shall perhaps hear the contention, so familiar in anti-vaccinist literature, that the effects of the inoculation itself are so serious that an increased immunity

is no adequate set-off. On this matter, the experience of Major F. F. Russell, of the United States Army Medical Service, is of value. He writes:—"At one recruit depot during the past ten months 6,690 men have been vaccinated three times, making over 20,000 vaccinations; and only 223 men were excused from duty as a result, or about one in ninety; this record is probably higher than would occur were it not for our custom of vaccinating simultaneously against small-pox on one arm and against typhoid on the other."*

That in individual cases, particularly if the subject does not avoid alcohol during the 24 hours following the inoculation, a severe reaction may follow, is not to be disputed; but that in the great majority such effects are slight and transitory would seem to be clear. We do not think it necessary to consider in detail the statistical evidence which has been furnished by foreign observers. The experience of the French Army in Morocco† and the very remarkable difference between the record of the uninoculated troops assembled at Jacksonville, Fla., in 1898 and the inoculated manœuvre corps at San Antonio, Texas in 1911, the conditions of service being closely similar in the two cases‡ are worthy of attention, but we are not in possession of all the details necessary for the performance of a strict analysis and believe that the data quoted above afford a more satisfactory basis for argument.

A consideration which should be had in mind when we assess the value of any inoculation statistics is the fact that, if inoculation really diminishes an individual's liability to contract an infectious disease, then its ultimate benefits extend beyond the individual to the whole community—both inoculated and uninoculated persons—of which he is a member. *A priori*, when we are using statistics for the purpose of deciding whether individual protection is in fact conferred, we cannot take this possibility into consideration. *A posteriori*, it may affect the conclusions to be drawn from a low incidence rate of disease among the uninoculated members of a community which includes a sensible proportion of inoculated persons.

Upon the whole, bearing in mind not only the personal suffering but also the damage to military efficiency which are associated with a dissemination of typhoid, we have little doubt that anti-typhoid inoculation is of first rate military importance, and that it is the duty of sanitarians to do their utmost to further its application in all units of the regular and territorial forces.

* Journ. American Med. Assoc., 1912, lix., 1362-4.

† Brit. Med. Journ., 1912, i, p. 51.

‡ J. R. Kean, Journ. Amer. Med. Ass., 1911, lvii., pp. 713-714 and 744.

A BRIEF NOTE ON TWO OR THREE INTERESTING "CARRIER" PROBLEMS IN EPIDEMIOLOGY OF SUMMER DIARRHŒA, INFANTILE PARALYSIS (POLIOMYELITIS), AND PELLAGRA.*

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MUSCA DOMESTICA AND STOMOXYS CALCITRANS AS DISEASE-CARRIERS.

FOR the past twelve years in season and out of season I have strongly urged the importance of *Musca domestica* as a carrier of disease—and have laid special emphasis upon the ordinary house-fly as being, in my conviction, the principal agent to be reckoned with in epidemic summer and autumn diarrhœa (*vide* local press reports of conference of Essex medical officers of health at Chelmsford, November, 1902; reports of medical officer of health for Borough of Southend-on-Sea, 1902-1907; special reports on epidemic diarrhœa in Southend, 1904 and 1906, and many contributions to epidemiological, public health and medical journals in this country, and contribution on "The role of non-biting flies in relation to disease" in proceedings of Bombay Medical Congress.)

When in 1902 I felt convinced in my own mind, from enquiries I had made into deaths from diarrhœa among infants, that *Musca domestica* bred in refuse heaps was the chief contaminating agent of milk (sugar, etc.) which gave rise to diarrhœa, I not unnaturally assumed that the life history of the common house-fly was well-known. My own observations had indicated at any rate the close connection between (1) the enormous deposit of house refuse, including stable refuse (amounting to hundreds of tons coming from London as well as from the borough); (2) warm weather; (3) excessive prevalence of flies in the houses round about the brickfields, and (4) the special incidence of infantile diarrhœa in the same areas. So certain was I that the flies bred in incalculable numbers in the refuse, and carried from thence polluting material to milk and other foods, which gave rise to diarrhœa, which subsequently became epidemic through the same agency (flies), I did not hesitate to boldly state these as facts in my special reports. I was astonished to learn, however, that there was no easily available literature upon the house-fly at the time, the only reference obtainable being a rare volume in the British Museum dating

back to 1792, and reference to two American papers by Packard and Howard, dated 1874 and 1902 respectively.

This extraordinary lack of scientific information concerning so ubiquitous a creature (which has forced itself on the attention of man in warm seasons and hot climes from time immemorial) has only during the present (twentieth) century been made good by the researches more particularly of Newstead and Hewitt, though many other observers have added interesting and important scientific information. The accumulated observations generally have been in the direction of confirming the opinions I have expressed during the past 12 years as to the importance of *Musca domestica* in the origin and spread of summer diarrhœa, particularly as regards infants. These opinions are now shared, I think, by most authorities with the possible exceptions of Shirley Murphy and Hamer, of London, who still suspend judgment.

For years past attempts have been made to discover a specific micro-organism for epidemic summer diarrhœa. From the very first I have maintained the opinion that there is no one specific organism common to all such epidemics; but that the micro-organisms concerned will be found to differ in different epidemics. I go further, and have stated the opinion, which I repeat, that the diarrhœa is due generally to excessive pollution with ordinary saprophytic putrefying organisms such as *B. Proteus*, etc., the excess of pollution, corresponding with the excess in numbers of flies, and with the relative topography to houses of the putrefying refuse from which the flies come. The houses nearest to the deposits suffer in greater proportion, one factor of importance being the sunny side of the street or the sunny rooms of the houses. Apart from Morgan's bacillus, I am not aware that any recent claim has been set up for a specific diarrhœa organism, and Morgan's Bacillus has not been found in all diarrhœa outbreaks. A recent number of the Ann. de l'Inst. Pasteur (Vol. 28, 1914) contains three articles by Metchnikoff, Bertrand and Berthelot respectively which support the views I promulgated ten years ago that common putrefactive organisms, and especially *B. Proteus*, are responsible for infantile diarrhœa.* Bertrand obtained occasional agglutination in 1:20 dilution with *B. Proteus*, while Berthelot experimented with combined

*In my Special Report on Epidemic Diarrhœa (Sept., 1904), page 16, I wrote, "I certainly think that other organisms besides bacilli of the colon group are capable of inducing infantile diarrhœa; e.g., the various forms of proteus, etc."

[Supplement.]

[PUBLIC HEALTH, December, 1914.]



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*Presidential Address to the Eastern Branch of the Society of Medical Officers of Health.

cultures of *B. Proteus* and *B. Aminophilus* on milk-fed rats. In these rats diarrhoea was produced of a severity which varied with the dose and the frequency of its repetition. (This would correspond with my expressed views as to the greater or less pollution of milk according to the number of flies). An interesting observation by Berthelot is that a vaccine prepared from the two bacilli effected a cure in the less severe cases. Metchnikoff found *B. Proteus* in 204 amongst 218 cases examined, and considered it the important organism concerned. He discussed the analogy between infantile diarrhoea and Asiatic cholera with reference to various factors—including flies. We may take it, then, as now generally accepted that *Musca domestica* plays an important part in infantile diarrhoea through its unfortunately impartial tastes as between putrefying filth in which it is bred on the one hand, and domestic articles of food on the other.

I pass on to the consideration of *Stomoxys calcitrans*—a biting fly—as a disease-carrier.

It is unnecessary for me to describe this fly at length. Suffice it to say that it breeds in cowsheds and stables in the country. It is readily recognised by its awl-like proboscis and its spotted abdomen. A casual observer would see no difference between it and an ordinary house-fly (*M. domestica*). My observations are that it is a common enough fly even in May (or April) as compared with *M. domestica*, which is rarely seen in any numbers until the end of June. When *Stomoxys* gets into houses it does not frequent the table or eatables, but is generally to be found at the window trying to get out again. It does sometimes bite persons indoors, but prefers to take its meals *al fresco*. The proboscis is quite a formidable awl-like weapon and when inserted through the skin is found to be very sharp. Having been bitten myself, I can say that on feeling a sharp stab and on looking down and seeing a fly at the site of pain, the natural instinct is to smite the offender with a crushing blow. But it is unwise to kill it in this violent manner when it has its lancets inserted under your own skin—because it may be carrying objectionable germs about its body or legs which would thus find free access to your lymphatics.

Stomoxys calcitrans is the chief biting fly in this country.

It has been known to infect with anthrax, and sporadic cases of anthrax among cattle may very likely be caused through the bite of an infected *Stomoxys*.

The chief interest of the *Stomoxys* at the present time is its possible connection with cases of poliomyelitis. To the student of epidemiology the interesting question at once arises—Why is poliomyelitis more a rural than an urban disease? Dust has been suggested as the medium by which the infected organism is conveyed to the nose and throat; but dust of an objectionable nature ought surely to be more common in towns. Were direct contact with other cases the most frequent source of infection, urban districts should suffer more than rural, and several cases should occur in some at any rate of the infected houses; but poliomyelitis is essentially a rural disease and only occasionally attacks more than one in a family. Take our own experience in Norfolk. In 1911 the first case that came to my knowledge was a case at Chedgrave, in the Loddon district, which I saw with Dr. McClintock, medical officer of health. The case showed signs of spinal meningitis, and a bacteriological examination of cerebro-spinal fluid obtained by lumbar puncture was reported by Dr. Claridge, Pathologist to the Norfolk and Norwich Hospital, to show an organism which he considered was the meningo-coccus. It is of course possible for cerebro-spinal-meningitis and poliomyelitis to run concurrently; and it is especially important to state that a sister of this child had just died in the same house from unequivocal acute poliomyelitis. The infection would appear to have been contracted in Suffolk in the neighbourhood of Stowmarket, where poliomyelitis cases had already occurred. A further case in the Loddon district had also been in Suffolk. The next case I saw was with our late esteemed colleague, Dr. J. C. R. Robinson, then medical officer of health for Depwade Rural District. The patient was a young lady living at Harleston, bordering on Suffolk, and there had been direct contact with a relative living within the affected area in Suffolk. A few weeks later I saw several cases with Dr. G. F. Cross, medical officer of health for the Downham Rural District. These appeared to be due to a direct spread from a centre of infection in and around Littleport, in the County of the Isle of Ely. Dr. Cross wrote a special report on the outbreak and published most of the details of the ten cases in the *British Medical Journal*. The cases occurred in three groups—at Southery Ferry, Crimbleham, and Barroway Drove. There were four cases at Southery, two at Crimbleham, and four at Barroway Drove. There appeared to be no connection between

the three groups as groups; but in the groups we found distinct evidence of contact in some of the cases, eight of which were under three years of age. We thought of "flies as possible carriers," and it was noted that "flies and other insects were very abundant." I must confess that at the time from my previous knowledge of *M. domestica*, I had that species especially in mind. But it afterwards occurred to me that I had on a previous occasion when visiting that neighbourhood been twice bitten by *Stomoxys calcitrans*, when out of doors, and I then became suspicious of this fly as a possible carrier, which suspicion was strengthened when I later ascertained that Rosenau, of New York, had suggested *Stomoxys* as a probable carrier of the poliomyelitis virus. To continue, however, with the details of cases in Norfolk, showing the rural prevalence of the disease in 1911, the other cases I learnt of and saw were six cases in the villages of Wendling and Yaxham, in the Mitford and Launditch rural district, which were brought to my notice by Dr. Howlett, of East Dereham. An interesting point to my mind was that these cases occurred at different parts of two straggling parishes, and no evidence of any contact was available in any of the cases. The six cases occurred in the course of nine months—the first case dating back to the previous December.

As far as I am aware there were no notifications of poliomyelitis in Norfolk during 1912 and only one in 1913.

Quite recently (May, 1914) I was asked by Dr. Forrest, medical officer of health of the Marshland rural district, to see with him what was an undoubted case of poliomyelitis. The patient was a little girl five years of age. I noticed flies in the house about the windows. (I have already commented on this as a characteristic of *Stomoxys* when in a dwelling-house). I captured half-a-dozen of the flies and found them all to be specimens of *Stomoxys*. Enquiring further as to breeding-places I found that there was a cowshed in one direction and stables in another, and animals kept on the premises all within about 100 to 200 yards of the house in which the child lay ill. On questioning the mother she remembered that she herself had been bitten by flies. Points in the history of the child that should be mentioned as possibly having some relation to the poliomyelitis are (1) she had scarlet fever in February; (2) on April 18th and 21st she was taken into

Wisbech, about four miles distant, the weather being windy and dusty; on Wednesday, the 22nd, she had malaise and headache, vomited, was "feverish and trembling"; on Thursday, the 23rd, she "couldn't stand"; on Friday, 24th of April, Dr. Forrest was called in. He found both legs paralysed, T. 101° F., some rigidity of neck and back, arms not affected, head rotated to the right side.

When I saw the child on May 6th she could just slightly extend the toes. Babinski's sign was present in the right foot, but the normal plantar in the left. Both were feeble responses. The legs were flaccid and very tender when touched. She cried out on an attempt to raise them. This extreme tenderness rendered it useless to determine whether Kernig's sign or Brudzinski's "neck" sign or "leg" sign were present. The child cried on an attempt to touch the legs or flex the neck. There was no indication of anæsthesia or sphincter trouble. I wish to draw attention to the history of tremors. Colliver regards a peculiar tremulous twitching of certain groups of muscles of the face, jaw and limbs, sometimes localised, sometimes general as pathognomonic of the pre-paralytic stage of the disease. I do not know that I personally should go further than to consider it as evidence of a profound disturbance of the nervous system.

When poliomyelitis occurred in Norfolk in 1911 the casual organism was unknown, and was thought to be so minute that it could not be recognised even under a high power of the microscope. I have always felt very sceptical as to organisms too small to be recognised. Granting for argument's sake that a particular coccus or bacillus or other type of germ is, in individual form, so minute as not to be seen even when magnified 1,000 times—the objection I raise, which appears to me to be incontrovertible, is that we know that organisms grow in colonies—each colony being made up of myriads of individuals; and therefore if an appropriate medium of cultivation is discovered, it ought to be possible to see colonies—even if individuals cannot be recognised. Flexner, with the assistance of Noguchi and others at the Rockefeller Institute in New York, has succeeded in solving the mystery. He and his colleagues have cultivated and identified the virus (micro-organism), and have reproduced the disease experimentally in monkeys. Their results as regards inoculation in monkeys have been confirmed by McIntosh and Turnbull in London (*Lancet*, 1913, p. 1,522). The method of

cultivation is on similar lines to that devised by Noguchi for the cultivation of spirochetæ. Sterile human ascitic fluid or brain extract forms the basis of the cultivating medium with the addition of small pieces of sterile animal kidney or other sterile solid tissue, the conditions being rendered anærobic by a layer of paraffin oil.

This "first" medium permits of a growth apparently not visible to the naked eye; but a "second" medium made from the "first," by adding nutrient agar in the proportion of 1 to 2, yields minute colonies which are visible clouding the medium. The organism is not ultra-microscopic, but is recognisable as globular in shape and occurs in pairs, chains or clusters. These can be stained by appropriate dyes (e.g., Giemsa's solution), and can thus be also demonstrated in the infected tissues. It is now well known that the virus is not confined to the anterior cornual cells or even to the brain and spinal cord, for it has been found in the mesenteric glands and in the mucous membrane and secretions of the nose, pharynx and intestinal canal. As regards the nervous system, the organisms have been found in the brain, spinal cord, Gasserian ganglia, vertebral ganglia, and the abdominal sympathetic. Thus, although some of the organisms may be so minute as to pass through the pores of a Berkefeld filter, they are not ultra-microscopic as was once supposed by many. The channel of infection is of course of importance particularly from a preventive point of view. Epidemiological evidence points strongly to the existence of human "carriers" as in a few of the Norfolk cases—and the virus has been found in the naso-pharyngeal secretions of contacts. Fortunately there appears to be a natural human insusceptibility to the disease which limits the spread of poliomyelitis by the channel of the nasal or pharyngeal mucous membrane. The maximum prevalence in summer suggests either dust-borne or fly-borne infection. Neustaedter and Thro (*Journ. Amer. Med. Assoc.*, 1913, 1, 1615) state that they have induced the disease in monkeys by inoculating them with dust from sick rooms. The case in the Marshland district which I have referred to was exposed to external dust, but there is no evidence of any previous human case in the neighbourhood to infect the dust.

The child was certainly freely exposed to the bites of *Stomoxys calcitrans*—but again

there is no evidence of any previous case to infect the fly. It is, of course, possible that the organism is not a true parasite, but under ordinary conditions a saprophyte capable of acquiring parasitic habits and of being carried both by dust and flies. Some experimental attempts to transmit poliomyelitis by the bite of *Stomoxys* have been unsuccessful, but it is probable the necessary conditions were not obtained, and negative results are worth little more than the mere negation of an individual attempt. We know that, fortunately, as a rule organisms or drugs do not readily enter the cerebro-spinal fluid from the blood; hence it was only to be expected that the proportion of negative experiments with *Stomoxys* would be great; but should one positive result be obtained, that would be fairly conclusive. That infection can be conveyed by *Stomoxys* has been definitely proved by Anderson and Frost, who obtained positive results with three monkeys exposed daily to bites of several hundred *Stomoxys*, which were at the same time allowed to bite two monkeys suffering from poliomyelitis caused by intracerebral inoculation. Symptoms developed in 8, 7 and 9 days respectively from the date of first exposure. Last year a disease resembling poliomyelitis was noted among horses in certain places in Germany, and as the *Stomoxys* victimises horses and cattle as well as human beings it is not difficult to understand how a first case may arise without a previous human case.

In the *Lancet* of November 15th, 1913, p. 1,378, Mr. Paul B. Roth described an interesting small epidemic of poliomyelitis, consisting of six cases which occurred in five small villages around Deddington in Oxfordshire. It is interesting to note that only one of these five villages had two cases. The only common factor to all was the proximity of stables or cattle-yards. These are the common breeding-places of *Stomoxys*, and Mr. Roth attributed the source of infection in each case to *Stomoxys* bites.

I may mention that the Marshland case, which I have here noted, had a few petechial spots such as might follow fly or flea bites.

The *Lancet* of November 13th, 1913, had another interesting contribution on poliomyelitis by Dr. Jubb (p. 1383), who described an outbreak of eight cases in all at West Kirby, in Cheshire. The cases on analysis could be divided into three groups.

1st Group.—This first case was attributed to a verminous donkey, and Dr. Jubb suggests

that the virus may be carried by lice. Why not? But this does not exclude *Stomoxys*, for the donkey must be stabled. Other stables were near at a baker's premises. No mention is made of *Stomoxys*, but the condition of their existence was obviously in evidence.

A year elapsed between this case and the next group.

2nd Group.—Four cases, Nos. 2, 3, 4 and 5. No. 2 occurred at the baker's shop about 100 yards from the first case. Cases 3, 4 and 5 in July and August appeared to be associated with Case 2. The possibilities are that infection was conveyed either (a) by infection from mucous membrane to mucous membrane, (b) by fleas or lice, (c) by *Stomoxys* or other flies. The time of year and the other evidence I have adduced make in my judgment the balance of probabilities in favour of (b) flies (*Stomoxys*).

3rd Group.—Cases 6, 7 and 8. Case 6 went to the same Sunday school as Case 3, and the brothers and sisters of Case 4. Cases 7 and 8 were more closely associated with Case 6. There is thus some evidence of direct or indirect infection between human cases; but there was also direct communication between the two districts in which Groups 2 and 3 resided by means of a milk cart from a dairy near the tertiary case. This Dr. Jubb admits is evidence in favour of the theory of the infection being carried by flies, though he appears rather to favour the idea of transmission by vermin (lice). In my judgment the evidence generally is more in favour of transmission by *Stomoxys*—the points being (x) season of the year, (y) proximity of stables, (z) a donkey under suspicion as regards the first case.

The very irregularity of a poliomyelitis epidemic, only one or two cases occurring in one village and one or two others in another, is suggestive of fly transmission—for comparatively few people are bitten by flies. The age incidence in my judgment is another factor suggestive of biting flies as the infective agent. The vast majority of cases occur in young children who go about with bare or half-bare arms and legs, affording opportunities to *Stomoxys* not frequently offered by older children or adults.

Mr. Roth, noticing a letter I had written to the *Lancet* on "The Range of Flight of *Musca domestica*," asked me through the *Lancet* if I could throw any light on the range of flight of *Stomoxys*. It is quite clear that this fly travels at least 200 or 300 yards from its breeding

place. Following a steaming horse or pony or donkey on a hot day it may easily cover three or four miles between village and village without actually flying all the distance—being carried most of the way on the cart or the animal. This would explain the circular incidence of the cases recorded by Mr. Roth.

There are then, as it seems to me, three principal methods of conveyance of infection—

- (1) By direct contact with a sufferer or a human "carrier."
- (2) By an insect carrier (more suspicion attaches to *Stomoxys* than any other insect, and there is now direct evidence of its conveying infection)—Anderson & Frost.)
- (3.) Dust.

Prevention.—As administrative medical officers of health, this is the practical point we are or should be most interested in. Assuming that the methods of conveyance of the virus are rightly designated—then to combat (1) the noses and throats of sufferers and contacts should be treated with antiseptics; and all handkerchiefs, etc., carefully boiled. To combat (2) *Stomoxys* must not only be kept out of houses, but as an even more important step stable refuse must be dealt with on the same lines as house refuse—no accumulations of more than a week to be allowed in hot weather. . . so as to do away with the breeding places of *Stomoxys* as well as of *Musca domestica*—two species of flies which in poetic and picturesque language may be looked upon as the emissaries of Beelzebub—the Lord of flies—and which are undoubtedly inimical to the lives and health of our infant population.

(3) Infected dust must be destroyed or disinfected.

Apart from Asiatic cholera—an allied disease—may I ask what short-lived epidemic makes such havoc as epidemic diarrhoea, due largely as I think, to the hordes of *Musca domestica* bred in refuse. What more cruel form of disease than poliomyelitis if the victim survives crippled for life?

Until the theories I have suggested are disproved, or supplanted by more logical theories as to the agents of infection, one of our means of prevention must aim at accumulations of house refuse, or stable or cowshed refuse in the neighbourhood of dwelling-houses, however humble. Ordinary methods of isolation and control of "contacts" will be extremely difficult, and would involve a large amount of

bacteriological assistance in a well-equipped laboratory.

No paper dealing with poliomyelitis in England should omit to mention the important reports and papers on epidemic poliomyelitis by Dr. R. J. Reece, Dr. Reginald Farrar, Dr. Mervyn Gordon and Dr. Hugh A. Macewen incorporated and issued in one volume by the Local Government Board (New Series, No. 61) with an introduction by the Medical Officer of the Board.* On the clinical side these contributions shewed the diversity of the symptoms met with, including several abortive cases in which little or no paralysis ensued. It was largely through these reports that poliomyelitis became a notifiable disease.

Another disease of increasing importance at the present time—viz., pellagra—is possibly carried by the stable-fly—*Stomoxys*. This disease is more widely spread than is realized. Take the history of pellagra in America, for example. It was not until 1909 that the disease was recognised in Illinois State, yet a recent Commission traced over 500 cases there. Interesting epidemiological data are forthcoming. In Spartanburgh County, S. Carolina, pellagra was found to affect 25 per 1,000 of the inhabitants, and was markedly in excess in the mill villages. It was five times as frequent among whites as among negroes. As regards sex, females are attacked in the proportion of three to one—but the excess occurs practically between 20 and 45 years of age.

As regards *occupation* about 50 per cent. were employed only in *housework*, even in the mill villages. There was very little evidence of spread in families. Of the total number of families with pellagra, 75 per cent. had but one case.

For a very long period pellagra has been attributed to diseased grain (generally rye). Comparative studies of the pellagrous and non-pellagrous populations are being carried out; the general outcome so far being to cast doubt on food as a factor and to suspect insects as carriers.

Sambon suspects the *Simulium reptans*, but apparently this insect is not found in North America. Jennings and King passed in review ticks, lice, bed-bugs, tabanidae, fleas, culicidae, simuliidae, and *Stomoxys calcitrans*, and considered the last-named to be the most likely carrier—it bites during the day and so may

* The copy of the memorandum on acute poliomyelitis circulated to sanitary authorities in December, 1911, is also incorporated in the volume.

account for the excess of infection in women. It may be of interest to note that in my Chadwick Lectures on "The Evolution of Epidemics"—when comparing leprosy with pellagra, I suggested that the fact that the leprosy bacillus was found in unaccountable numbers in the skin suggested that a biting fly, such as *Stomoxys*, might play an important part as a carrier of that disease.

The investigations of the Thompson-McFadden Commission in connection with pellagra seem to me to make this suggestion worthy of attention and research on the part of those who live in countries where leprosy is endemic—especially in view of the fact that there are many anatomical and clinical features common to both leprosy and pellagra.

I have said sufficient to indicate that the *Stomoxys calcitrans* has to be reckoned with as a possible carrier of two diseases of public health importance which have recently come into prominence, viz., poliomyelitis and pellagra; and I conclude by showing you specimens of the *Stomoxys* which I captured in a house in which the recent case of poliomyelitis occurred in West Norfolk.

Had a county laboratory been in existence I should have had these flies subjected to bacteriological examination to determine whether the organism described by Flexner and his colleagues could be recovered from them. But I have not yet succeeded in convincing my authority that the results would justify the expense of providing a laboratory for the county.

APPOINTMENTS.

DR. H. H. BRADLEY has been appointed medical officer of health of Mytholmroyd U.D. during the absence of Dr. J. S. Hudson on military service.

DR. HERBERT M. CARGIN has been appointed medical officer of health of the borough of West Hartlepool.

DR. SEYMOUR CHAPMAN has been appointed assistant medical officer of health (including the duties of assistant school medical officer) of Scarborough during the absence of Dr. Tatham on active service.

DR. GEORGE JESSEL, tuberculosis officer to the Lancashire C.C. and of Wigan C.B., has been appointed acting medical officer of health of Wigan, owing to the absence of Dr. Wynne, medical officer of health, on military service.

DR. ROBERT MCCOULL has been appointed medical officer of health of Prudhoe U.D.

DR. GEOFFREY E. OATES has been appointed medical officer of health of Ilford U.D.

DR. C. T. SCOTT has been appointed medical officer of health of Market Harborough during the absence of Dr. J. H. Thomas on military service.

DR. NORA F. SMITH has been appointed assistant medical officer of health and assistant school medical officer of Eastbourne.

DR. DAVID SOMMERVILLE has been appointed medical officer of health of Harrow.

DR. A. H. WEAR has been appointed assistant medical officer of health and assistant school medical officer of South Shields C.B.

LOCAL ADMINISTRATION IN FRANCE AND GERMANY.*

By A. A. MUSSEN, M.D., D.P.H., Assistant Medical Officer of Health, City of Liverpool.

THE importance of the study of local administration in relation to public health was impressed very strongly on me while listening, on a recent occasion, to a delightful address by Lord Bryce at the University of Liverpool on University Education. While criticizing the arrangement of the Faculty of Commerce, he expressed surprise that no mention was made in the syllabus of the science of administration. He told us that much importance is attached to this subject in America and Germany owing to the development of various views on local government, and systematic lectures on administration at home and abroad are given to students in the universities of these countries. Now the science of administration appears to be even more closely linked up with public health than it is with commerce, and therefore greater importance might, with advantage, be given to it in public health diplomas. If you glance over the names of the most successful men who have helped during recent years to develop the public health service, you will find that they did so chiefly by their talents as administrators. It was not as experts in medical science that they excelled so much as in being able to suggest new lines of investigation, or in utilizing scientific discoveries by turning them to practical account. As time advances, highly trained administrative officers of this class will be increasingly necessary for dealing with problems of local health administration, and if the medical profession do not provide them, then other professions will not be slow to do so.

In a recent number of PUBLIC HEALTH, several excellent articles appeared on the subject of the curriculum of the diploma in public health, containing a number of important suggestions as to the training of public health officials. I was surprised, however, that none of them mentioned the subject of administration, except in so far as it was associated with the practical work of the student in the medical officer of health's department. When, however, we consider that his success or failure as a medical officer of health probably depends more on his administrative ability than on any other aspect

of his work, a strong case can be made out for a more extended study of administration as a whole.

In considering the various points of interest in local government problems, it will not be necessary to go into explanatory detail with regard to English local government and its relationships to the central government. We are all more or less familiar with the status and duties of local authorities and the method of dividing the duties among committees of the council. With regard to the appointment of the officials, and their relationships with the local authority and the central government, these are matters of every day experience to most of us. Generally speaking, it may be stated that English local health officials are appointed by, and under the full control of, the local authorities, and the very large influence which they undoubtedly exercise in their respective districts, and in the country generally, is due, not to any inherent power vested in them as holders of official positions, but to their expert knowledge and experience, and also in a great measure to the personality and reputation of the individual officers as advisors of great and responsible public bodies. Practically all executive power is vested in the council, and no action can be taken without its expressed or implied sanction.

When we come to consider local government in France, we find a very different arrangement of duties and responsibilities. This arrangement illustrates very well the passion which the French nation have for uniformity, and as a consequence we find that whether a community is a city with a population of 100,000, or a village with 50 or 100 residents, they have all the same system of administration. This system has been changed many times since the Revolution in 1789, and is now based on the municipal law of 1884.

For the purpose of local government, France is divided into 86 departments (*cf.* English counties including contained boroughs). The departments are divided into districts, or *arrondissements*, districts are divided into cantons and, finally, cantons are divided into *communes*. The first and last of these divisions are the most interesting ones for our purpose.

At the head of each department is the prefect, who is appointed by the Minister of the Interior (corresponding to our President of the Local Government Board), and who receives a salary of £800 to £1,500 a year, according to the size and importance of the department.

He is the sole executive officer for carrying on the administrative work. He has a prefectorial council of local persons of influence to assist him, and under certain circumstances he is bound to ask for their opinion, but he is in no way compelled to follow the advice that they give.

He occupies a position of delicacy, as he is at once the agent of the government and the representative of the area which he administers. He has to do his utmost to please the party to whom he owes his appointment, but at the same time with universal suffrage, his actions may at any time be adversely criticised in parliament. He controls the "police," which includes many things besides what we understand by police duties, such as a considerable portion of sanitary law. He is a professional official, who starts somewhere in the civil service, and hopes to mount up by merit to one of the senior positions in the service. From the point of view of local administration, however, the commune is the more interesting area.

There are about 36,000 communes in France, varying in population from 500,000 down to a few hundred; the same code of administration applies to all.

At the head of the commune is the mayor, who is the sole responsible executive officer of the administration. He is elected by the council for four years, but he is in no way responsible to it; he is, however, under the control and direction of the prefect of his department as his superior officer. He is not permitted to receive a salary, but the council may provide him with an allowance towards the expenses of the office.

He is assisted by "adjoints," or deputy-mayors, who are also appointed by the council, but are entirely under the control of and responsible to the mayor himself.

The council is almost entirely a deliberative and advisory body and has no executive powers. It appoints committees for special purposes and determines the policy to be adopted, but the detailed and daily application rests with the mayor.

These deliberations are, moreover, under the strict control of the local prefect, who can prohibit discussions on certain subjects, and can even take the extreme step of suspending the members for a month and reporting the facts to the President of the Republic who may dismiss the council altogether and order another to be elected. The system of standing

executive committees with which we are familiar has never been adopted, but the employment of purely advisory committees to be consulted on various subjects is used with much advantage and in many ways.

To each of the adjoints, or deputy-mayors, are allotted certain duties, such as public health, water supply, or tramway management. They appear to correspond to the chairman of our standing committees without being responsible to a committee for the way in which they carry out their duties. For these they are entirely responsible to the mayor, who can give them as much or as little freedom of action as he thinks right. The adjoints have, of course, the assistance of the expert officials of the commune to carry on the executive business of the commune.

The chief officials of the municipal departments are practically all appointed by the mayor, with the exception of one or two, such as the treasurer, who is appointed by the President of the Republic in the case of large towns, and by the prefect in the case of smaller districts.

No confirmation of the appointments made by the mayor is necessary at the hands of the council, but in the case of police officials the approval of the prefect is necessary.

To the mayor is also given the power to suspend or dismiss a municipal officer without the sanction of the council, and the only authority which has any power to review his action in this matter is the Council of State, which is the highest administrative court of the Republic.

With regard to the lesser officials, the practice is to leave to the adjoints and the permanent heads of the various civic departments a large degree of freedom in the appointment of persons to fill the vacancies in their respective staffs. There is no system of competitive examination for national or municipal service, but a large use is made of probationary appointments, that is, temporary appointments for a year or two in order to test the candidate's fitness for the post.

On the whole, the character of the French municipal service is high. The officials appear to hold permanent positions, and in the larger cities are provided with pensions at the end of their term of service. They are rarely dismissed without good and sufficient cause, and never for political reasons as in some cities in America. A distinguished American writer states that "The French have

*Read before a meeting of the North Western Branch of the Society of Medical Officers of Health.

scrupulously maintained the forms of an elective non-bureaucratic municipal government, but they have taken similar care to secure that efficiency which comes from the actual performance of all important administrative functions by skilled and experienced officials, who, secure in the tenure of their posts, go about their work with little or no captious interference from the elected representatives of the people."

At the present time it is interesting to note that all local military arrangements are under the control of the mayor, who prepares lists of persons liable for service; also of horses, vehicles, arms, carrier pigeons, and other supplies that may be requisitioned by the national authorities in time of war. When mobilisation takes place each of the 36,000 mayors becomes the local military agent for the Minister of War. In fact, the efficiency of the French military system depends largely upon the work constantly going on at the *mairie* of every municipality, and accounts for the ease and rapidity with which mobilisation was carried out on the recent occasion.

With regard to public health administration, the subject is complicated by the fact that a considerable number of subjects which we in England would consider sanitary administration is placed under the supervision of what is called the municipal police, such as regulation of streets and buildings, cleansing of streets, and a good deal of sanitary law. In fact, to this system of dual control has been attributed the backward condition of public health administration in France generally. This is well exemplified in Paris, where the sanitary administration is divided in an apparently arbitrary manner between the Prefect of the Police, and the Prefect of the Seine, so that it is difficult to know when the function of the one begins and the other ends.

However, there is evidence that the disadvantages of this state of things is becoming recognised, and steps are being taken to remedy it.

When we consider the local administration in Germany, we find that it is organised on different lines from either France or England, and there is a difficulty in adequately describing it, as it is not based on any uniform plan, as in the other two countries. Each of the 25 States which compose the German Empire have their own systems of local government in force, and even Prussia, whose example in this respect, as in others, dominates the Empire,

has not a uniform system which applies to all her provinces.

I propose, therefore, to deal only with the most characteristic features of the Prussian administration, which are more or less typical of German towns.

Prussia is divided into 12 provinces (Rhineland, Silesia, Hanover, Posen, etc.), and at the head of each, is a chief president, a professional official appointed by the Crown and not unlike the French prefect. He is assisted by the (a) provincial council (a body of six) (b) the provincial assembly, which is elected from the towns and rural districts in the province, and (c) the provincial committee, which actually carries on the local administration. No great interest is attached to the provincial government, but it provides large areas for administration of education, poor relief and roads. Provinces are divided into government districts, of which there are 35, and they appear to exist entirely as branches of the central government.

The next sub-division is the circle. There are about 490 rural circles in Prussia, and each is governed by (a) an assembly of about 25 or 30 members elected by the taxpayers; (b) a *landrath*, an official appointed by the Crown on the nomination of the assembly, and (c) the circle committee of six unofficial members elected by the assembly for six years.

The duties of the assembly are entirely deliberative, and those of the committee are executive, but the routine work is in the hands of the *landrath*. He superintends education, has a staff of medical officers, food inspectors, etc., to assist him. In this way he resembles the French mayor.

We now come to the municipalities, which are probably the most interesting of all the German institutions, and about which a very great deal has been written by English and American observers. There are 1,270 towns in Prussia, and the governing bodies are (a) the town council; (b) the magistrat or administrative board, and (c) the burgomaster.

The town council is elected by the ratepayers under the famous "three-class system," which is quite unique, and has been described by Bismarck as "the most miserable and absurd election law that has ever been formulated in any country."

This system in which the voters are divided into three classes may be roughly described as follows: The average amount paid by each voter is found, and all ratepayers paying less

than that amount are placed in the third class. The total amount paid by this class is deducted from the total amount of rates, and the remainder divided into two nearly equal parts. Then, beginning with the largest ratepayers, the officials take off as many names as suffice by their payments to make up the amount of one of these halves; these are placed in the first class; the remaining ratepayers who pay the other half are placed in the second class. Each class elects a third of the council.

The proportion of voters in each class varies in different towns, but usually the first class contains about one or two per cent. of the voters; second class, 10 per cent., and third class 80 to 90 per cent., so that it usually happens that two thirds of the council are elected by less than one fifth of the voters. In some cases it becomes ludicrous, as in the case of Essen, the seat of Krupp's works, where until recently the first-class contained three voters, the second 400 and the third 19,000 so that supposing the council consisted of 60 members, 20 of them would be selected by three voters and would, therefore, have the same weight as the 19,000 voters of the third class who would elect another 20 members. This system of electing the council only applies to Prussia and not to the other States of the Empire.

There are some peculiar restrictions as to membership, such as that which prevents two members of the same family sitting in the Council or Executive Board at the same time. Moreover, keepers of hotels, inns and public houses may not be members of the Executive Board.

The most important body, however, in the government of the city is the magistrat, the executive or administration board. It consists of the burgomaster and a number of paid and unpaid members, all of whom are elected by the council. The paid members are professional experts of various kinds, and are appointed for a period of twelve years, with every prospect of re-appointment or a pension at the end of the term. The unpaid members must be residents in the city. The latter are appointed for six years and are usually chosen from among the more experienced members of the council. The number of members of the executive board varies from eight in small towns to thirty in large towns, and there is a leaning towards having a preponderance on it of unpaid members over the paid professional experts, although in several large towns the members of each class are nearly equal.

This board has been aptly described by an English writer as a committee consisting of aldermen and chief officials.

The duties of the town council are entirely confined to the questions of deliberating and deciding on the policy to be undertaken. The carrying out of those decisions is left absolutely under the control of the executive board. The powers that a German town council has of local self government are very large, in fact they can practically do anything that the good government of the town may seem to require. There are certain actions which require the approval of the central government which is rarely refused, and is given through the medium of the district boards, so that the expensive Private Bill procedure with which we are familiar, is not required.

The duties of the magistrat are the entire executive control of municipal affairs. It appoints the municipal civil officers, and can make definite decision in all matters which do not involve expenditure or are simply the carrying into effect resolutions of the town council. Practically all resolutions of the council must be approved by the magistrat before they can come into force, and although the council have power to initiate legislation, as a matter of fact nearly all the proposed legislation originates with the magistrat.

It has been described by an American writer as "the most indigenous, the most striking and the most successful in the whole range of German government; for it concentrates enough power to be effective in action and at the same time its members are held sufficiently amenable to popular control."

The head of the municipality is, of course, the burgomaster, who is elected for twelve years, or in the case of some of the larger cities, for life. He is said to combine the chief duties of the mayor and town clerk of an English town, but might be more appropriately described as the salaried managing director of the community.

He is paid a salary which varies from £2,000 a year in Berlin, to £200 or £300 a year in the smallest municipalities with an official residence or an allowance in lieu of it, and a liberal pension at the end of his term of service. He is elected by the council, usually from among a number of candidates who have held similar positions in other towns, and are therefore experts in the work of administration.

The burgomaster of a German town is, therefore, totally different from the heads of

French and English towns, where the mayor is a private citizen, who takes the position for a year or so, and may have very little experience in municipal affairs. The former is an expert, a professional administrator, who looks upon his office as his career, and seeks promotion on his public record like any other official.

His duties are, broadly speaking, to supervise the machinery of civic administration, and to keep it in smooth working order at every point.

In order to do this, he is vested with disciplinary powers over the whole municipal service, and may suspend, fine, or even imprison an official who appears to be remiss in his duties. He cannot, however, dismiss them, and he has no power of appointment.

In addition to these important bodies, the German town has usually a number of committees appointed by the council to advise and report on the working of the various departments of municipal work. They consist of members of the council and other persons interested in particular subjects, such as education, sanitation, tramways, waterworks, museums, etc. A member of the magistrat presides over each of these committees, and they report to that body, and not to the town council.

In dealing with municipal government in Germany Mr. W. H. Dawson, who is recognised as a great authority on the subject, says:—"The characteristics of German municipal government which must chiefly impress the outside observer are the wide power exercised by the local authorities and the facility with which these powers are from time to time extended and adjusted to changing conditions," to which one might add the system which is seen in all German government, of keeping the legislative body that makes the law entirely distinct and separate from the executive body that carries out the law. He sums up his convictions by saying that "while German municipalities can teach us little or nothing worth learning in regard to the electoral basis of local government or the constitution of town councils, their institutions of the professional and salaried mayor and aldermen represent the highest and most efficient development of municipal organisation reached in any country."

With regard to public health administration in German towns, the consideration of this is complicated by the fact that, as in France, it

is divided between two authorities, namely, the police and the civil authorities.

Under the police supervision are placed practically all the measures for the prevention of infectious disease, such as notification, investigation, disinfection, etc.; also the supervision of dentists, midwives, nurses, etc. The inspection of factories and the sampling of food-stuffs are also under police control.

The civic authorities, on the other hand, provide hospitals with isolation wards attached to them, and supervise the water supply, sewage disposal, and street cleansing. They also deal with measures for promoting infant welfare and the prevention of tuberculosis, as well as housing and the erection and control of slaughter-houses.

From this it will be seen that several closely related questions are administered by different authorities with, what must be, undesirable results.

As regards the status of the medical officer of health in Germany, I am informed that only in one or two large towns does the magistrat include a medical expert among the paid official members, although there are plenty of engineers and architects. There are hopes, however, that the good example of these towns will be followed by others in the future.

Besides these few points on local administration, which have been merely touched upon, there are others of great interest in both countries, such as the system of poor relief, the policy with regard to land, and the trading enterprises undertaken by local authorities. I hope, therefore, that my few scattered notes may stimulate an interest in a subject which, I venture to think, should prove very interesting to a public health official.

PRESENTATION OF A MOTOR AMBULANCE TO THE WAR OFFICE BY THE MEDICAL MEN OF ESSEX.—The members of the medical profession in the county have subscribed a sum of a little over £420, and have purchased therewith a fully-equipped Motor Ambulance with four stretchers, etc., and have presented it to the War Office for use of the wounded in France and Belgium. The subscriptions have been obtained by the various medical officers of health in the county, and a complete list of the donors can be seen at the office of the county medical officer of health. The Ambulance will bear a brass plate on which will be inscribed:—"This Ambulance was presented to the War Office by the Members of the Medical Profession in Essex, England, November, 1914."

THE EFFECT OF COPPER SULPHATE UPON CERTAIN WATER WEEDS.

By J. H. GARRETT, M.D., D.P.H., F.L.S.,
Medical Officer of Health, Cheltenham.

SOME time since I described in PUBLIC HEALTH the destructive effect produced upon chara foetida by adding copper sulphate to the water contained in a reservoir forming part of the Cheltenham water supply. I am now able to record a further experiment in which chara and other water weeds were involved.

The water in this instance was that contained in an ornamental lake in Pittville Park, Cheltenham. This water is not used for drinking purposes, but the weeds caused the water to become objectionably malodorous, besides interfering with the pleasurable exercise of boating. The waste from the reservoir of drinking water that was last year treated for the chara finds its way into this lake by the brook that feeds it, and possibly may have infected the lake with chara. I had not noticed it in the lake prior to this year, but I had not looked for it, and it probably existed, as the disagreeable odour developed in the water had been complained of before this year, and I think this must have been chiefly due to chara.

The lake was carefully examined in the early part of May this year, when the chief aquatic growths that were flourishing in it were three in number, 1, conferva; 2, chara; 3, zanichellia.

A species of conferva nearly covered the bottom of the lake through its upper third, where the water was shallowest. This is the green slimy growth commonly met with in ponds and other waters, consisting, as seen by the microscope, of a tangle of threads which cling together to form masses or sheets. The plant in the warm sunlight gives off bubbles of gas, by aid of which portions of the growth float up to the surface, to again sink as the gas escapes or is beaten out by rain or agitation. The debris of the growth of this weed year by year causes the water in which it grows to become shallower, and thus greatly assists in converting ponds into marsh or morass.

The chara foetida began where the conferva ended, and covered the bottom of the lake practically everywhere in the lower two-thirds. In the middle of May it was flourishing exceedingly and looked most healthy, growing up straight and thick to a height of about a foot from the bottom, but not reaching the surface in any part, its habit being entirely sub-aqueous.

The zanichellia palustris, or horned pond weed, was first seen in the lower part of the lake, and was growing in patches amongst the chara, the patches being several yards across. This weed develops long grass-like blades which reach the surface, and the plant ordinarily flowers in July. It impedes rowing by getting round the oar-blades, and when some of it gets cut up by the oars, this floats upon the surface of the water like wet hay, and so becomes a greater nuisance still to the rowers. Otherwise it is quite innocuous and has no smell.

There were a few plants also of ranunculus aquatilis, or water buttercup, which at the time of first observation were in flower.

The area of the lake being about five acres and its average depth about $3\frac{1}{2}$ feet, a calculation showed that roundly the contents represented 5,000,000 gallons, or 50,000,000 lbs. of water. One hundred-weight of the crystalline sulphate of copper dissolved in this bulk of water gave a strength of one part in some 440,000 parts, or, say, two parts per million. It is not usual to put so much copper sulphate as this in water intended to be afterwards used for drinking, and it is double the quantity put into the water to destroy the chara in the reservoir last year. There is, however, a stream of water constantly passing through the lake. In dry weather in summer this stream is small, probably not exceeding more than 100,000 gallons a day for a considerable number of days together. After heavy rains the flowing water is liable to be increased to more than ten times this amount, and no doubt the water is, from time to time, completely changed, by a heavy rainfall, in less than a week.

The first hundred-weight of copper sulphate was put into the water on May 21st, 1914. The crystals, in the form of coarse powder, were put into double bags, which were suspended from a petrol motor boat at various depths, the boat being then driven about all over the lake in a way calculated to distribute the copper equally through the water. Complete solution was effected in about six hours. The copper could then be detected in water taken from any part of the lake, by a suitable chemical test. The weather was quiet for nearly a fortnight, giving the copper a chance to exert its effect upon the plant life without undue dilution. At the end of this period a very heavy rainfall ensued, which in the course of a week caused so much water to pass down the brook as to completely change the water in the lake and

wash away all the copper. The weather then again became settled, and during the next fortnight the flooded state of the brook and the lake subsided to the dry weather conditions such as prevailed at first, and after this, on June 18th, a second hundred-weight of copper sulphate was put into the water and had ample time to produce its effect before being washed away.

I must mention a rather peculiar phenomenon that occurred after adding the copper sulphate to the water. The water had before been clear, so that the bottom could everywhere be seen, with all the weed growing there. After the addition of the copper the water became quite turbid and of a yellowish green colour, this turbidity being well developed by the fourth day, and the bottom could no longer be seen. Microscopic examination of the water showed it to be swarmed with green proto-coccus-like, small individual cells. I wondered at first whether these were spores produced by the conferva, or whether the fact of some men having been employed in removing some of the conferva by raking it up from the bottom into a punt, had brought up this green cell from the mud at the bottom of that part of the lake. These conjectures were contradicted upon adding the second dose of copper sulphate, for then the conferva was at rest and not in active growth, and exactly the same phenomenon of these small green cells swarming through the water to make it turbid again occurred. When a bottle of white glass containing the water in this state was set aside a bright green sediment soon appeared at the bottom, very apparent to the naked eye, and this sediment consisted entirely of these cells. It therefore appears that the growth of this small organism was stimulated by the copper sulphate, and, anyhow, the fact of this development taking place when it did, indicates that copper sulphate will not kill or prevent the growth of every green alga, even though the organism be of the smallest size and simplest structure. This organism remained in the water evidently in a living state for many days along with the copper. The end history of this development was that the water from being green became more yellow and by the end of a month had cleared itself, the organism disappearing.

The effect of the copper upon the several water weeds mentioned above as existing in the reservoir can be briefly summarised.

The conferva was affected adversely; where it was growing in fresh young growth its colour

was turned to drab and its general growth was checked. This weed however existed in such thick mats that it was not expected that it would be killed, nor was it. In September it was again in flourishing state, and multiplying as it had done in the spring.

The effect upon the chara was specific and deadly. The weed was destroyed entirely. Three days after the addition of the copper sulphate the plant, from being in most strong, healthy growth, had fallen down flat upon the bottom, its colour being changed from yellowish green to a dirty drab, and it began at once to disintegrate. Portions for some time could be fished up on the point of an oar blade, but at the end of the first week these, when shaken in the water, fell to bits. The bottom of the lake through the greater part of its area had been covered with the weed, which would have weighed very many tons in its fresh state, and at the end of a few weeks not a vestige could be discovered anywhere in the lake, even though a diligent search was made in the blue mud fished up from the bottom in various most likely places. When the water became clear so that the bottom could be examined by the eye, no chara could be seen. The unpleasant smell that the water of this lake had acquired in other years was not noticed this year after the chara had been killed.

The zanichellia is a plant of higher organisation, and was strongly grown before the copper sulphate was put into the water. Its growth was emphatically checked and its colour changed to a duller, browner hue. It seemed to have been made more brittle, as much came to the surface in a loose state. I think its growth could have been stopped had the water been treated at an earlier date, say about the first week in April, when the growth of the weed was beginning. After the copper had been washed out of the lake as the result of the heavy rains, this weed recovered and grew with phenomenal rapidity, so that there was much more of it at the second application of the chemical than at the first. The effect of the second dose was as the first. It evidently injured but did not rapidly destroy the weed. The zanichellia, however, did not come into flower, and towards the end of July it ceased to trouble, disappearing to a great extent spontaneously. Whether this was a natural effect pertaining to season, or whether the copper had anything to do with it I cannot tell. It was upon June 18th that the second dose of copper sulphate was applied, and my

note book shows that on July 2nd the zanichellia was decidedly less than prior to June 18th, but some had been taken out with a rake, especially some that was floating loose. On July 14th it was noticed that there was still much of this weed, considerable patches showing where the growth was apparently active, and it appeared to be of natural colour and healthy. On July 27th the note indicates that the zanichellia was much less and had practically ceased to trouble. "It has ceased to grow as if the season of its growth were done, but it has not flowered." So reads the entry in my note book. What remained was chiefly floating free, having become detached from the bottom. On August 21st very little of this weed could be found in the lake. In the third week of September the growth had again begun and some of this weed could be seen in nearly all parts of the lake, though for the most part under water, and not anywhere high enough to obstruct rowing. After this, however, it again died back, and none remained at the end of October.

The three or four small patches of ranunculus aquatilis disappeared after the first application of the copper. The quantity of it, however, was too small for one to be sure that the extensive growths of this weed, commonly seen in stagnant or slow flowing waters, could be as quickly got rid of.

Any effect produced by the copper sulphate, in this strength of two parts per 1,000,000, upon the larger animal life of the lake was looked for. There were numerous water-fowl living upon it—swans with cygnets, geese, ducks with quite small ducklings, and a pair of moorhen with newly hatched brood. None of these suffered any manifest injury. When the water was clear droves of fish, numbering altogether two or three hundred, or more, could be seen in the water. About 25 of these were killed and floated to the top dead. These were chiefly roach, with a few bream and one large carp.

MILITARY APPOINTMENTS.

DR. H. E. CORBIN, medical officer of health of Stockport and a Captain in the R.A.M.C., has been appointed to a position which is practically that of medical officer to the troops of the East Lancashire Division.

DR. R. DUFFIELD, medical officer of health of Paddington, now Captain, R.A.M.C., attached to 1st City of London (Sanitary) Company.

DR. J. R. KAYE, medical officer of health to the West Riding C.C. and Lieut.-Col., R.A.M.C.T., is now attached to the Divisional Staff at Doncaster.

DR. T. G. SHAND, assistant medical officer of health of Wakefield, now Lieutenant, R.A.M.C.

DR. J. S. TEW, medical officer of health of West Kent C.S.D., appointed sanitary officer for duty in the Chatham Administrative District.

POLIOMYELITIS IN A COUNTRY TOWN.

By RORY McLAREN, M.D., D.P.H.,
Assist. County Medical Officer of Health, Dorset.

THE small country town of Beaminster in the County of Dorset has recently been the scene of a sharp little outbreak of poliomyelitis. This outbreak, whilst conforming in general characteristics to such others as have been described of late in various parts of the British Isles, nevertheless presents certain features of important and somewhat suggestive interest.

The town of Beaminster lies in a hollow of the Dorsetshire hills, seven miles from the nearest railway station, in a purely agricultural district, the chief occupation in the surrounding country being farm dairying. The population of the town (Census 1911) is 1,702; the climate is mild and equable, as the town is only eight miles distant from the Channel.

The first case was notified as commencing on August 2nd. Within four weeks, fifteen further cases occurred. The disease then as suddenly lapsed, with the exception of one isolated case on October 3rd occurring in a child freshly introduced into the district from London. Thus in all, seventeen cases have been recognised, sixteen of these occurring between August 2nd and 29th. In five of the cases, the resultant paralysis is severe, whilst in six others there is distinct weakness remaining. In this outbreak no adults were attacked; the ages of the cases varying from eighteen months to sixteen years. Ten boys were affected as against seven girls.

Distribution of Cases.—As in other recorded epidemics the distribution of the cases was exceedingly irregular, though in no instance at a further distance from the town than a mile and a half. Four of them were small isolated cottages amongst the fields at distances from half-a-mile to one-and-a-half miles from the town. The remaining thirteen cases were scattered irregularly through the town. Only in one family did a multiple case occur—a brother and sister aged respectively 1½ and 2½ years.

Two cases are of especial interest as having developed the disease shortly after leaving the district. Case No. 16:—A girl, aet 15, came on a visit to the town from July 29th to August 12th. She then returned to her home in Somerset, and eight days later (August 20th), developed a severe attack of poliomyelitis affecting the anterior tibial group of muscles.

There were no other cases of the disease in the district in Somerset, either before or after her return. Case, No. 17:—Child, aet $1\frac{1}{2}$, female. This girl arrived in the district from London about September 21st. She stayed in an isolated house a mile-and-a-half from the town, only passing through this once in her perambulator. The other occupants of the house, however, frequently went into the town. On September 26th, she left the neighbourhood. Seven days later (October 3rd) she was attacked by well-marked poliomyelitis.

The generally accepted theory that this disease is spread by carriers, who seem to be extremely numerous—so much so that the recognised "cases" may be regarded as unfortunate incidents in an otherwise widespread benign infection—receives further confirmation from this outbreak. In the first place we have the exceedingly irregular distribution of the cases, which is difficult to account for on any other theory. Then there is the absence of multiple cases in the same family. This was scarcely due to lack of opportunity. Case No. 3 slept in the same bed with his younger brother; Case No. 1 was a member of a family of eight children! Investigation brought to light further confirmation of the carrier theory.

It was found that the fathers of three cases, and the elder brother of a fourth, were all employed in the same shop. There seems to have been practically no other communication between three, at any rate, of the families. All four adults showed no symptoms of disease. The incident seems analogous to that recorded by Fraser and Comrie, at Leith, and quoted by Chapin, where cases of cerebro-spinal meningitis occurred in five families, whose respective fathers worked in the engine-room of the same ship. They further stated meningococci were demonstrated to be present in the naso-pharynx of each of these workmen.

Attempts to discover the original source of introduction of the disease have so far failed. The difficulty becomes more apparent when one recalls that the first case clinically recognised is by no means necessarily, or even probably, the first case that was affected in the district. I examined at some detail the possibility of milk, dust, and flies from stable refuse being causal agents.

Milk could apparently be excluded with some certainty. Not only was there no evidence pointing towards it, but one of the cases was using milk from their own private cow, and the mother—a careful woman—

always "scalded" this milk before giving it to the children.

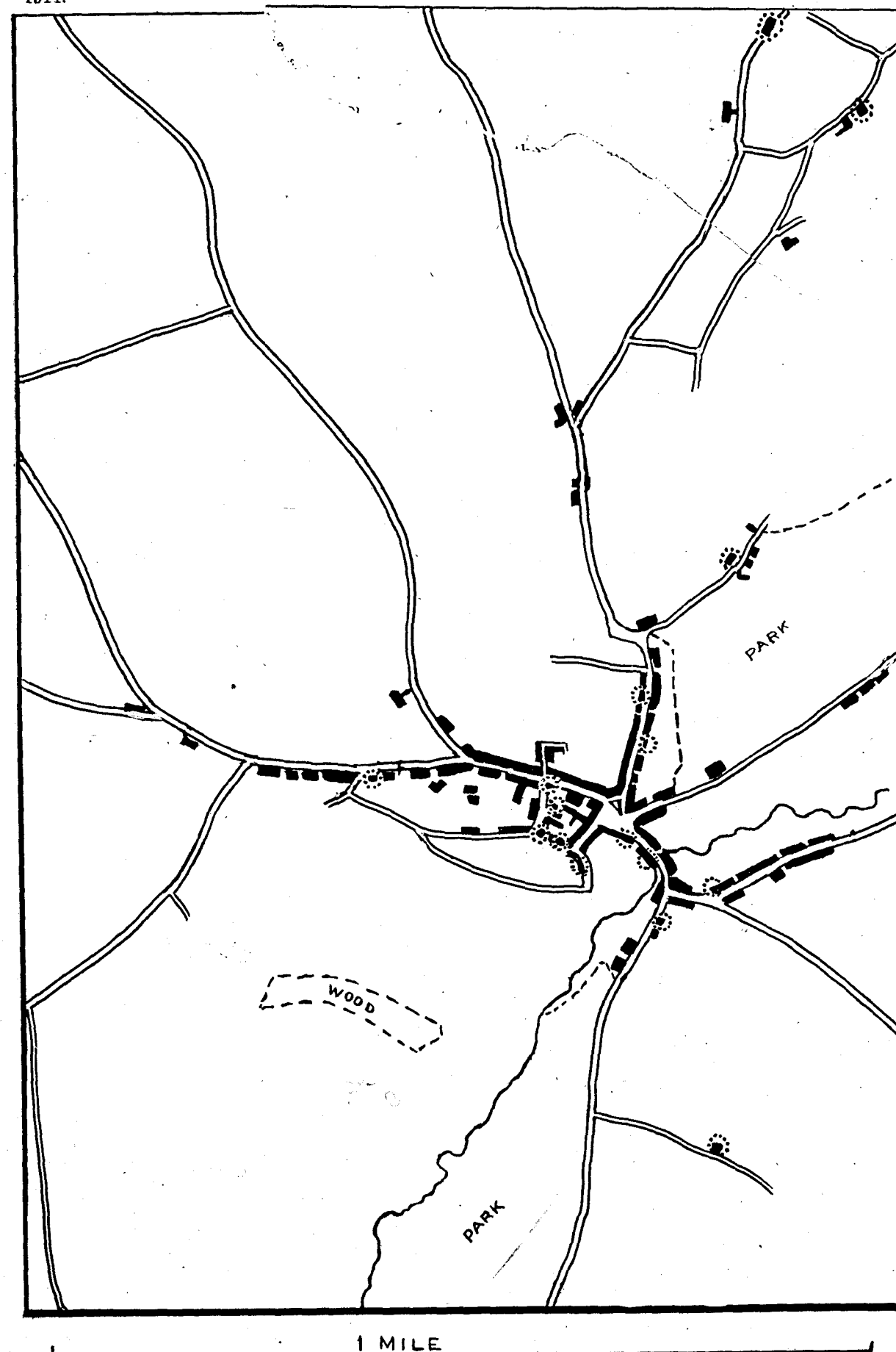
Dust also seemed highly improbable as a contributing factor. Beaminster cannot be called a dusty town even in the main street; whilst some of the cases occurred in cottages isolated by quarter-of-a-mile or so in fields—the very picture of rural solitude.

The evidence against flies from stable refuse was far less conclusive. Indeed one of the cases—though not an early one—was in a cottage with a large stable against the outer wall. Three other cases occurred within a hundred yards of this stable. On the other hand this was the most thickly populated part of the town.

There remains the possibility that the disease was introduced into the town by a carrier from some other part of the country, and I am inclined to think that this was the most probable origin. On the other hand, I have not been able to trace any such connection. The nearest cases occurring in England about the time were two cases in Wincanton rural district, some twenty miles distant, on August 2nd and 12th, respectively. No connection between the cases could be established; moreover, it will be seen these two cases were synchronous with, and not anterior to, the Beaminster outbreak. Beaminster lies only five miles distant from the Somerset border, but Dr. Savage, the county medical officer of health for Somersetshire, informs me that there was only one case in the county during the preceding three months.

The outstanding features of this outbreak seem to be the extremely swift spread of the infection, with a sudden termination to the epidemic, and secondly the unexplained fact that the outbreak was confined to so limited an area. As regards the first point I think the evidence points to a rapid and wholesale infection of the community with consequent "using up" of susceptible material. This is further evidenced by the experience of Case No. 17, a baby introduced fresh from London, who promptly took the disease. This isolated case occurred on October 3rd; the last case previously noted was on August 29th. Incidentally this gives some idea of the length of time the infection may remain in a district.

The second point—the fact that the outbreak was limited to an area within a mile and a half of the town—is not so easily explained. The two cases also which developed poliomyelitis seven days after leaving the district, caused no



secondary cases in the districts to which they had gone, although with one of them no precautions were taken. The factors causing the occasional natural limitation of these outbreaks to such confined areas are at present little understood, and are well worthy of further study.

OBITUARY.

THE LATE LIEUT. HERBERT LESLIE HOPKINS, M.D., B.S. (Lond.).

AMONG the list of those who have given their lives for their country appears the name of Lieut. Herbert Leslie Hopkins, assistant county medical officer of health and tuberculosis officer of West Suffolk, who was killed in action on the 19th September last. The loss of this able officer will be much felt by all who had the pleasure of knowing him, and there is no doubt that a brilliant and successful career in public health administration was before him had he lived. He had recently passed the examination for the M.D. of the University of London in State Medicine, being the only successful candidate. After obtaining leave from the County Council, he left on August 15th on military duty, losing his life little more than a month later. His conduct in the field led to his mention in the despatches of Sir John French, and the following letter from a brother officer to his mother shows the circumstances in which he met his death and the esteem in which he was held.

3rd November, 1914.

I am glad to say I can give you a good deal of information as to how your son met his death.

We were entrenched on the hills just north of the Aisne at a place called Vailly and had been under a steady shell fire for a week continuously. Your son behaved with most extraordinary courage and bravery, as our men were being hit every minute and he did everything in his power to bandage their wounds and relieve their pain, all the time under the heaviest of shrapnel fire.

On September 19th one of the enemy's shells pitched just behind a small trench completely burying one man, and smothering him; your son immediately dashed to the place and did all he could to bring the man round to life, when the unlucky shell came that killed him instantaneously. He was buried that night in a small copse by the river, close to the village, with another of my brother officers.

When our Colonel sent in the official casualty despatch, your son was mentioned for his conspicuous coolness and bravery under fire.

I may add that during his short stay with us your son became most popular both with the officers and men, as he was always doing what he could for us all, and his death was a great grief to us all.

I most sincerely hope that the knowledge that he died in such a really heroic manner may in some way compensate you for your great loss, which I can assure you, you share with all the officers and men of my Regiment who knew your son.

Thanking you for your kind wishes with regard to my own wound, which is going on very well.

I am,

(Signed)

Lieut.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856.

RECONSTRUCTED 1888.

INCORPORATED 1892.

AN ORDINARY MEETING of the Society was held at the Offices of the Society, No. 1, Upper Montague Street, Russell Square, London, W.C., on Friday, November 13th, 1914, at 5 p.m. *Present:* Dr. Herbert Jones, President (in the chair), and Drs. P. W. Spaul, D. L. Thomas, B. C. Stevens, J. M. Cowie, Duncan Forbes, J. Fairley, W. J. Howarth, R. Veitch Clark, F. C. Linton, H. A. Hall, W. H. Symons, W. A. Bond, George F. Buchan, Christopher Rolleston, J. P. Walker, Thos. Strain, J. M. Clements, J. J. Jervis, C. Boyd, and as visitors, Dr. W. N. W. Kennedy and Miss Pratchett.

Minutes.—Dr. G. F. Buchan submitted the minutes of the last Ordinary Meeting, held on Friday, April 17th, 1914, and these were approved and signed by the President.

Correspondence.—Dr. G. F. Buchan said that the only correspondence was a letter from Dr. T. W. N. Barlow, apologising for not being able to attend.

Election of Fellows and Associate.—The following candidates, who had been duly nominated, were balloted for, and were declared by the President to be duly elected, viz.:—

ALLEN, WALTER HENRY, L.R.C.P., M.R.C.S., "Ferndale," Hurst Hill, Coseley, Staffs, Coseley U.D.; BENDLE, JAMES HUNTABLE, M.B., M.R.C.S., 4, Oldfield Rd., Bath, Somerset C.C. (Assist. S.M.O.); COWAN, ANDREW DONALDSON, M.B., Ch.B., D.P.H., Wellwood Terrace, Kirkintilloch, Dumbartonshire, Dumbartonshire (S.M.O.); DART, GEO. HERBERT, M.D., M.R.C.P.E., D.P.H., 79, Lassell Street, Greenwich, S.E., Greenwich Met. B. (Tuberc. Officer and Dep. M.O.H.); DAVIES, JOHN PHILLIP HENRY, M.A., M.B., B.C., D.P.H., Garreg Wen, Ystrad-Rhondda, Glam., Rhondda U.D. (Assist. M.O.H.); GERRARD, WM. INNES, M.B., Ch.B., D.P.H., H.M.S. "Jupiter," c/o G.P.O., London; HANCOCK, MARY DEBORAH, M.A., L.R.C.P. & S.E., 53, Newman Road, Erdington, Birmingham, Birmingham C.B. (Assist. S.M.O.); MACGREGOR, ALEX. S. M., M.D., D.P.H., Sanitary Chambers, 23, Montrose Street, Glasgow, Glasgow City (Tuberc. Officer); McFEAT, WALTER JAS., M.B., Ch.B., D.P.H., Calderview, Motherwell, Lanarks; MARTIN, GEO. JAS. MASSON L.R.C.P. & S., L.M.I., D.P.H., London Cottage, Hendford, Yeovil, Somerset County (Assist. S.M.O.); MOXEY, PERCY, M.B., Ch.B., L.S.A., D.P.H., 6, Great Western Road, Dorchester; NEWTON, ARTHUR H., M.B., Ch.B., School Clinic, King Street, Coventry, Warwickshire and Coventry (Tuberc. Officer); ORR, JAMES, L.R.C.P. & S.E., L.F.P.S.G., D.P.H., Town Hall, Barrow-in-Furness, Barrow-in-Furness C.B. (M.O.H.); PEEBLES, J. S., L.R.C.P. & S., D.P.H., Park Street, Bridgend, Glam.; REID, WM. BRAMWELL, M.B., C.M., D.P.H., "Dalveen," Lampton Road, Hounslow, Heston and Isleworth U.D. (Assist. S.M.O.); RICHARDSON, GEO., M.D., D.P.H., 22, Duke Street, Millom, Cumberland; ROBERTSON, JAMES, M.B., M.S., D.P.H., Council House, Sneathwick, Staffs.; SINCLAIR, NORMAN J., M.B., Ch.B., D.P.H., County Buildings, Forfar; SMITH, SYDNEY, M.D., D.P.H., Dunedin, New Zealand, Dunedin. *Associate:*—BARNES, EDWIN CLAY J.P., Ashgate Lodge, Chesterfield.

Nominations for Election.—Several nominations for election to the Fellowship of the Society were read.

Dr. W. J. Howarth (M.O.H., City of London) then read a paper on the "Marking of Meat." The President and Drs. Veitch Clarke, W. A. Bond, G. F. Buchan, and F. C. Linton took part in the subsequent discussion, and Dr. Howarth replied.

The meeting then adjourned.

Southern Branch.—A meeting was held at the Municipal Tuberculosis Dispensary, Portsmouth, at 2.30 p.m., on Friday, November 6th, 1914. There were present:—Dr. Forbes (in the chair), Drs. Fenton, Wilshaw, Walker, Wilkes, Hoyle, Lyster, Lauder, Nankivell, Willoughby, Glass, Blake, Livingston, and Fraser (acting hon. sec.).

The minutes of the last meeting were read and confirmed. Arising out of the minutes—the question of postponing further meetings of the Branch until the end of the war was discussed, and as the majority of those present were in favour of continuing to hold the meetings it was decided to adhere to the original programme for the Session. Further, arising out of the minutes, Dr. Willoughby, who was chairman at the previous meeting, stated that it was by formal resolution on a proposal by himself, which was seconded by Dr. Nankivell, that Dr. Fraser was appointed acting hon. secretary to the Branch during the absence of Dr. Gibson on military duties.

Letters of regret for absence from the meeting were announced from Drs. McLaren, Stott, Griffiths, Gibson, Lockhart Stephens and Farr.

A letter from the Parent Society, dated October 8th, was read, enclosing the copy of a letter received from the Secretary of the Departmental Committee on Building By-Laws, and asking that any views the Branch might care to express on the subject might be sent to the hon. secretary of the Society.

The acting hon. secretary announced the receipt of a letter from Dr. R. Lloyd Legate stating that he had decided to accept the Presidency of the Branch for the ensuing Session. It was proposed by Dr. Lauder, seconded by Dr. Willoughby, and resolved that the Branch record their appreciation at Dr. Legate's decision.

Two notices of motion, one from Dr. Stott and one from Dr. Lyster, dealing with the subject of division of the Branch were read. Dr. Lyster withdrew the motion of which he had given notice and proposed that of Dr. Stott, which was as follows:—"That application be made for the Division of the Southern Branch into two, namely, a South-East and South-West Branch." This was seconded by Dr. Fenton.

The following amendment was moved by Dr. Walker and seconded by Dr. Wilshaw:—"That a sub-committee of three be appointed to report at the next meeting of this Branch on the question of the sub-division of the Branch." On being put to the vote the amendment was lost.

A further amendment was then proposed by Dr. Nankivell and seconded by Dr. Willoughby as follows:—"That in view of the absence of several members of the Branch on military duties the consideration of the proposal to divide the Branch be postponed till the end of the war." On being put to the vote this amendment was lost.

The original resolution was then put to the meeting and was carried. The voting was seven for the resolution, five against, and two did not vote.

It was proposed by Dr. Lyster, seconded by Dr. Livingston, and resolved that a sub-committee of three be appointed to prepare and present the case for the division of the Branch to the Council.

It was proposed by Dr. Lauder, seconded by Dr. Walker, and resolved that the above sub-committee be composed of the President (Dr. Legate), Dr. Lyster and Dr. Fraser (acting hon. secretary). Dr. Lyster gave notice of a motion to rescind the foregoing resolution as to the composition of the above sub-committee at the next meeting of the Branch.

Dr. Lyster proposed and Dr. Hoyle seconded the following motion of which notice had been given by Dr. Lyster:—"That in future no travelling expenses be paid by the Southern Branch." On being put to a vote the motion was lost. Dr. Lauder gave notice that he should bring this subject up for discussion again at the next meeting.

Dr. Wilshaw gave notice that at the next meeting of the Branch he should move a resolution to rescind that resolution which had been passed, in which it had been decided to make application for the division of the Southern Branch into two.

It was proposed by Dr. Lyster, seconded by Dr. Willoughby, and resolved that the next meeting of the Branch on the first Friday in December be held at Eastleigh, at 2.15 p.m., and that the Reference from the Departmental Committee on Building By-laws be then considered.

Scottish Branch.—A meeting was held in the North British Station Hotel, Glasgow, on Saturday, November 14th, 1914, commencing at 11.30 a.m. *Present:* Drs. Robb, Clark Trotter, Yule, C. R. Macdonald, Adam, J. T. Wilson, Richards, W. F. Brown, Stevens, McMichael, Campbell Munro, W. S. I. Robertson, Currie, and Buchanan. Dr. Robb (President) in the

chair. Apologies for absence were received from Drs. Williamson, Templeman, Mackay, Miller, and Bruce.

The minutes of the previous meeting were read and approved.

The PRESIDENT said that before the ordinary business of the meeting commenced he wished to refer to the death of Professor Sir Henry Littlejohn, who was one of the original members of the Scottish Society of Medical Officers of Health, and the first chairman. He referred to the eminent position held by Sir Henry Littlejohn in the public health world and to the great value of the services he had rendered to the country by the unrelenting energy with which he had devoted himself to all questions affecting the health of the community. It was resolved that the Branch should record its sense of deep regret at the death of Sir Henry Littlejohn, and that a letter should be sent to his son, Professor Harvey Littlejohn, expressing the sympathy of the Branch for the members of the family in their loss.

MILK AND DAIRIES (SCOTLAND) ACT, 1914.

The PRESIDENT explained the steps which had been taken after the last meeting of the Branch to bring to the notice of those in authority the amendments which, after full consideration, the Branch considered advisable. He reminded the members that the Bill had now been passed, and expressed the opinion that, although the amendments suggested by the Branch had not been adopted, the Bill was a considerable advance on previous legislation on the subject.

A letter from the Council of the Society was read, enclosing a communication from the Local Government Board of England with regard to a Departmental Committee appointed to inquire into the working of building bye-laws in England. It was decided that, as Scotland was not directly concerned in the inquiry, it was unnecessary for the Scottish Branch to express any opinion. The Secretary was directed to reply to that effect.

The circulars lately issued by the Local Government Board with regard to the co-operation between civil and military sanitary authorities were then considered. Each of the members present stated what was being done in the district over which he had control. It was found that everyone present was giving the military authorities all the assistance in his power, that the disinfection of clothing and bedding was apparently being done by all local authorities free of charge, that some local authorities were reserving beds for use in case of outbreaks of enteric fever among the troops, that other local authorities, while willing to give every assistance if an outbreak did occur in the district, were not specially ear-marking any beds for the purpose, and that although the charges made for military patients

varied somewhat, the average charge was about thirty shillings per week. It was felt that it would be desirable that the charges made should be as far as possible uniform throughout the country, and Dr. MUNRO moved that the Branch express the opinion that four shillings to four shillings and sixpence per day is a reasonable charge for the provision of hospital accommodation for troops. This was agreed to.

Dr. WILSON drew the attention of the Branch to the fact that a considerable number of the members were at the present time on active service, and expressed the opinion that at some time a record should be made of the names of those of the members who were taking part in the defence of the country.

NATIONAL HEALTH INSURANCE ACT.

TUBERCULOSIS SCHEMES.

Consideration was then given to the tuberculosis schemes in operation throughout the country, special attention being paid to the provision made for dispensary and domiciliary treatment. A long and valuable discussion followed, which was taken part in by all the members present. Opinions were divided as to the value of providing immediate dispensary treatment, some of the members holding that the dispensary was a valuable and necessary part of every scheme, while others considered that, although dispensaries might be necessary in the future, it was advisable to have other parts of a scheme in thorough working order before a decision was come to as to the extent to which dispensary treatment should be given.

With regard to domiciliary treatment, it was found that up till now none of the members had framed any scheme providing for payment to medical practitioners for the treatment of tuberculosis cases at their homes. Several of the members expressed a strong objection to any such arrangement being made, and after discussion the question was left open, to be reconsidered when the necessity for doing so became more urgent than it appeared to be at present.

The procedure adopted with regard to non-pulmonary cases was also discussed shortly in an informal manner, and the proceedings then terminated.

Northern Branch.—The annual meeting was held in Dr. Kerr's office, Town Hall, Newcastle-on-Tyne, on Friday, October 23rd, 1914. *Present:* Dr. J. W. Smith (President), Drs. Mostyn, A. Smith, Renney, Dickinson, Giles, Kerr, Taylor, Arthur, Stainthorpe, Stobo, Clegg, Hill, and Cameron.

Dr. J. W. Smith, medical officer of health for Ryton, was inducted as President for the ensuing year.

The minutes of the last annual meeting were read and confirmed, and the annual reports of the Council, Secretary, and Treasurer were read and adopted.

Dr. S. G. Mostyn was elected as Vice-President of the Branch.

Dr. J. Taylor was re-elected Hon. Secretary and Treasurer.

The Council for the ensuing year was elected as under:—

Drs. Armstrong, Arthur, Renney, Hislop, Stainthorpe, Hembrough, and Hill. Drs. Kerr and Hembrough were elected as auditors.

The SECRETARY read a letter from the Society respecting evidence to be submitted to the Departmental Committee on building bye-laws. It was agreed that the matter be discussed at a special meeting, the date of which was left to the Secretary to fix.

The PRESIDENT then read his address on "Public Health Subjects."

On the motion of Dr. MOSTYN, seconded by Dr. RENNEY, a hearty vote of thanks was accorded to the President for his very interesting paper. On the suggestion of Dr. HILL, it was agreed that the paper be sent to PUBLIC HEALTH, and that it be discussed at some future meeting, the date of which was left to the Secretary to fix.

Dr. MOSTYN raised the question of encampments for troops, and suggested, in view of the difficulties which had arisen, that it would be well to have a discussion on the matter. It was agreed to hold a special meeting about the middle of December to discuss the question. It was decided also that the Annual Dinner be held on the same date, at the close of the meeting, the date of which was left to the Secretary.

Dr. ARTHUR asked if any member could give information as to the circular of the Local Government Board on Maternity and Child Welfare. Dr. HILL said that in the previous week he had an interview with Dr. J. Lane-Clayton. There seemed to be a strong feeling that outside of the large towns the work should be taken up by the county authorities. The Board had practically guaranteed payment of half of the county council's expenses during the six months ended September 30th, 1914. They appeared to be inclined to experiment in the direction of maternity and infant centres, and from inquiries he had made it seemed as though the Board would allow tuberculosis dispensaries to be used as such centres, provided that the same rooms were not used for both purposes. He was inclined to try the experiment at one of their own dispensaries. Dr. KERR said he did not view favourably the direct recognition of voluntary societies by the Local Government Board and the Board of Education, who were bidding against

one another in an undignified manner for the favour of these societies. In Newcastle the local Mothers' and Babies' Welfare Society was working with the Corporation on a combined scheme, and the Sanitary Committee had agreed to make formal application to the Local Government Board for a grant both for the local authority and on behalf of the Society. Drs. Hill and Mostyn were of opinion that the offer to voluntary societies was made to allow them to take advantage of the grant in districts where nothing was being done by the local authority.

Dr. KERR asked if there was any further information available as to the use of diachylon as an abortifacient. He had information which led him to suppose that inquiries for the plaster by women from druggists were, temporarily at least, more numerous at present in districts where troops were stationed.

North-Western Branch.—The opening meeting of the Session was held at Manchester, on Friday, October 23rd, 1914. *Present:*—Dr. H. H. I. Hitchon, Retiring President, (in the chair). Drs. Mussen, Burton, Jessel, Stallybrass, Daley, Stalker, Banks, Barlow, Wood, Talent, Butterworth, Welsh, Joseph, Shaw, Sergeant Marsden Leigh, Martin, Rees-Jones, Webb, Stephenson, Fraser and McMaster (hon. sec.). Apologies for inability to be present were read from Drs. Meredith Young, Garstang, Tattersall, Buchanan, Wynne and Hewitt.

Upon his induction to the chair by the retiring President, Dr. A. A. Mussen expressed his appreciation of the honoured position the members had given him.

It was unanimously resolved that the best thanks of the Branch be given to Dr. H. H. I. Hitchon for the admirable way in which he had discharged the duties of President in the last Session. The decision of the Branch to appoint a part-time medical officer of health as its President had been more than justified by his careful conduct of the business and his deep interest in the welfare of the Society.

The minutes of the last meeting were confirmed. The following recommendations from the committee were adopted:—

- (a) That the Annual Dinner be postponed.
- (b) That, in view of Dr. Corbin's absence on military duty, the appended re-arrangement of the officers of the Branch be made.
Honorary Sec.: Dr. A. B. McMaster.
Council Representative: Dr. A. A. Mussen.
- (c) That as the Branch was now entitled to a third Council Representative—Dr. H. H. I. Hitchon be elected.

It was proposed by Dr. Marsden, supported by the President, Drs. Martin and Sergeant and resolved, that this Branch of the Society sends to Professor Harvey Littlejohn and the family of the late Sir Henry Littlejohn an expression of the great regret of the Society at the death of Sir Henry. Dr. Marsden referred to the great loss which the Public Health Service had experienced, and after quoting at length from the appreciative references in the *British Medical Journal* to the late Sir Henry's career, he said, "The feelings which arise on casting one's thoughts back over twenty years or more are full of sadness when they fasten on individual members of the Society, whose presence at our meetings was a source of pleasure, not unmixed with pride; but of sadness brightened by the glimpses of the future when we think of them as members of a living body, as workers even now in the field which man has been sent into the world to cultivate—the field where truth is to be sought and found. As a member of that living body, as an immortal worker in that field of truth, with sadness brightened by glimpses of the future, we must now think of Henry Littlejohn."

The President then gave an address on "Local Administration in France and Germany."

Dr. HITCHON proposed a cordial vote of thanks to the President for his interesting address, this was seconded by Dr. Sergeant, and supported by Drs. Martin, Marsden and Barlow; Dr. Mussen briefly replied.

Midland Branch.—A meeting was held at the Council House, Birmingham, on Thursday, November 5th, 1914, at 3.30 p.m. *Present:*—Dr. J. M. Cowie (in the chair), Drs. T. Ridley Bailey, G. Petgrave Johnson, Robert Hughes, Armly Ashkenny, A. Hamilton Wood, D. J. Clark, John Robertson, W. M. Clendinnen, R. W. Stocks, A. H. Newton, C. E. Tangye, H. Gibbons Ward, T. Orr, H. Handford, W. Spencer Badger, E. A. C. Swainson, E. J. Moffatt, John Priestley, H. M. Cargin, W. H. Davison, and E. H. Snell. Apologies for absence were received from Drs. Henry May, Doig McCrindle, G. A. Auden, Bostock Hill, and J. Orton.

Dr. JOHN PRIESTLEY, senior school medical inspector, Staffordshire County Council, read a paper on "What Precisely is the Benefit of School Medical Inspection?" and an interesting discussion followed, which was joined in by Drs. Hughes, Badger, Hamilton Wood, J. Robertson, T. Orr, R. W. Stocks, G. Petgrave Johnson, Armly Ashkenny, and Ridley Bailey; and Dr. Priestley briefly replied.

A reference to the Branch concerning the matter of the Society giving evidence before the Departmental Committee on building bye-laws was

considered. It was proposed by Dr. PETGRAVE JOHNSON that the Council of the Society should be asked to consider the advisability of submitting evidence to the Departmental Committee relating to the cheapening of building by a relaxation in the bye-laws concerning such matters as width of streets and footpaths, distance between houses, separate sewers for storm-water, joint drains, height of rooms, etc. This was seconded by Dr. CLENDINNEN, supported by Drs. ORR and ROBERTSON, and carried unanimously.

North-Western Branch.—The monthly meeting was held in Manchester on November 20th, 1914. *Present:* Dr. A. A. Mussen (in the chair), Drs. Herbert Peck, J. W. Talent, R. Sydney Marsden, Meredith Young, G. W. N. Joseph, W. Stewart Stalker, Alice Stalker, Jean R. Shaw, James A. Harris, George Jessel, Cyril Banks, T. W. N. Barlow, H. H. I. Hitchon, G. Granvill, Buckley, Frank Webb, W. F. Dearden, and A. B. McMaster. Apologies for absence were read from Drs. Garstang, McClure, Buchanan and Wheatley.

The minutes of the last meeting were read and confirmed.

The HON. SECRETARY read a letter from Professor H. Harvey Littlejohn, in which he thanked the members of the Branch for their expression of sympathy on the death of his father, Sir Henry Littlejohn.

An invitation was received from the Manchester Christian Conference for two delegates to attend a discussion on "Poor Law Policy with Regard to Widows and Children." Drs. T. W. N. Barlow and R. Sydney Marsden were asked to represent the Branch.

Dr. G. W. N. JOSEPH then read a paper on "Second-hand Clothing and the Spread of Infectious Diseases." A very interesting discussion followed, in which the President, Drs. Stalker, Barlow, Meredith Young, Talent, Jessel, and Webb took part. A cordial vote of thanks to Dr. Joseph was proposed by Dr. R. SYDNEY MARSDEN, and seconded by Dr. HERBERT PECK, who referred to a paper read by Dr. Roche, of Dublin, at a Conference in Liverpool in 1895-96, entitled "The Spread of Infection Through Pawnshops." In replying to the discussion, Dr. Joseph thanked the members for their unanimous vote of thanks.

SCHOOL MEDICAL SERVICE GROUP.—The Hon. Treasurer of the Group points out that in order to meet the expenditure since October 1913, it is necessary to ask the members of the Group to contribute the sum of 7/- each. Contributions should be addressed to Dr. C. W. Hutt, 7, Gloucester Place, Brighton.

Public Health

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DEATH-RATES AND BIRTH-RATES.

IT has often been suggested in the past that an effect of sanitary administration would be the survival of a race of weaklings, who would not be able to compete with those who practised the more spartan methods of allowing unfavourable environment to eliminate the unfit from the population. The survival of the unfit was thought by some to be likely to have results which would eventually manifest themselves in a racially disastrous fashion. If there is any foundation for this view war must equally be thought of as leading to the destruction of the best a nation can produce, and hence civilisation and war may be thought of as operating in the same direction. However this may be, there is no likelihood that fear of national deterioration will lead to relaxation of effort to improve environment or to limit military undertakings when the national honour is concerned. The fable of the fly upon the wheel still conveys a useful lesson even in this enlightened age.

There has been in the past too little recognition of the part nature plays in determining the death-rate of populations. This has led to claims being made for the institution of particular administrative procedure through mistaken inferences, based upon declining rates and concomitant alterations of conditions of environment. In considerable degree the fact has been ignored that a large proportion of the decline of the death-rate during recent years has been due to lessening mortality from diseases which are subject to natural variation, and credit has been claimed for administrative effort which is probably more due to other influences than that which man has been able to exercise. This, however, need not discourage us in our effort to study disease and to contribute as far as we can to its decline, or to limit as far as possible the natural increase which may manifest itself. What we have to avoid is the making of a claim that a variation in death-rate is necessarily the result of administrative effort so long as the variation is in the direction of decline.

A subject which is now recognized as being of as much importance to the future of nations as the behaviour of the death-rate is that of

the birth-rate. The behaviour of the birth-rate in numerous European countries presents several points of interest, for it has manifested decline in successive decennia since 1871-80. The subject has been studied arithmetically, with the result that reduction in the number of marriages, postponement of the age of marriage, reduction in the proportion of women in the population who are of child-bearing age, fail to afford sufficient explanation of the decline, and the inference has been drawn that the difference between the decline which can thus be explained and the actual decline has been due to intentional restriction of births.

This inference is open to the criticism that it regards the birth-rate as naturally stationary, just in the same way as the death-rate has been regarded as naturally stationary when its decline is attributed entirely to administrative effort. There is obviously a possibility which may well be taken into account, that the fertility of women may be subject to variation in the same way as the death-rate. High death-rates and high birth-rates accompany each other. In London the group of districts which showed the greatest decline in the death-rate showed the greatest decline in the birth-rate.

The whole subject of decline of the birth-rate is full of opportunity for speculation, and facts are much needed before any attempt is made to draw inferences of a positive character. The extreme importance of the subject from a national point of view is emphasised by the present war, which has demonstrated the risk to which small nations are subjected when they have on their borders a strong and unscrupulous neighbour. If the increase of patriotism which the events of the present time have produced could be utilised for checking such intentional restriction of births as is really the product of selfishness and love of ease it would tend to improve the morality of the nation as well as its future security. This much might be attempted with more prospect of success at this moment than before, and while it is still open to us to think that a more potent cause is operative in reducing the birth-rate than that which we now have under consideration, we may well consider that as far as possible this factor should be eliminated.

ADDRESS ON PUBLIC HEALTH SUBJECTS.*

By JAMES W. SMITH, M.D.,

Medical Officer of Health, Ryton-on-Tyne U.D.

GENTLEMEN:—In thanking you for the honour you have done me in electing me to the position in which I now appear before you, I recognise it as a compliment, not so much personally to myself, as to the part-time medical officers of health whom I represent, and who are essentially general practitioners. There can be no doubt that medicine was originally curative, that it dealt with the treatment of disease and accident, that it was an art before it became a science and had a philosophy, and that gradually, as the causes of disease began to be recognised and steps for their removal became possible, preventive measures began to be taken and preventive medicine as a science was founded. It was only by a very gradual evolutionary process as the knowledge of medical science advanced that preventive medicine became of more and more importance, and that the medical officer of health became separated from the general practitioner. But it was through the general practitioner acting in both capacities (1) in the treatment of disease, and (2) its prevention, as a general practitioner of the art of medicine and a part-time medical officer of health, that preventive medicine, or, as it now called, public health, came to occupy the important position that it does to-day, and that the medical officer of health has become such a power in the State. That power and that influence is becoming, and is bound to become, greater and greater, and although there is much to be regretted in the disappearance of old offices and institutions, the time is fast approaching—nay, it is almost here—when the part-time medical officer of health will have entirely disappeared, and the all-time medical officer of health will have become paramount. I recognise in myself therefore a representative of a decadent body of medical men, which, through the all-powerful influence of natural selection, has become evolved into a more advanced type of medical officer. And in accordance with the modesty which ought to befit such a representative, I do not venture to address you on the more advanced matters of public health, which I shall leave to my successors in this chair, but content myself with submitting to you some thoughts on such subjects as have come within

* Presidential address read before the Northern Branch of the Society of Medical Officers of Health, on October 23rd, 1914.

my scope as a general practitioner interested in public health matters, and lay before you such views on the future of the medical officer of health as a life's experience has suggested to me.

Now in dealing with the health of the individual or the community and the departures from it, either negative or positive, which constitute disease, there are always to be taken into consideration the two factors, the organism and the environment. The former represents the outcome of all the structures and influences which have come to him through his parents, grandparents, in short, his ancestry, and may be summed up as his heredity; the latter represents the sum total of the surroundings in which he has to live his life. The state of health or disease is the measure of adaptability between the individual and his environment. Perfect heredity and a perfect environment mean perfect health. Imperfect heredity and a perfect environment or *vice versa* mean imperfect health. As a matter of fact, there is no such thing as a perfect heredity or a perfect environment, and there is no such thing as perfect health. But the degree of imperfection, namely disease, is greater or less according to the interaction between the two factors. It is obvious that the heredity factor, so far as the individual is concerned, is not amenable to the influence of the medical officer of health, at least, only indirectly so. With him it is *nascitur non fit*. It is on the environment that the measures of the medical officer of health are brought to bear, and it is through his influence on the environment that all the improvements in public health have been effected. How great these improvements are can be seen by the most cursory comparison of the death-rate, the infantile mortality-rate, the prevalence of the infectious diseases, of tuberculosis, etc., etc., of the present time with 50, even 20, or even 10 years ago. But everyone will admit that great as these improvements are, and they are becoming greater, they are not as great as they should be. That is largely the result of the non-attention to the factor of heredity. For though as concerns the individual the heredity cannot be altered, as concerns the community it can, and the future medical officer of health will have to work with the eugenicist to attain that end by ways and methods which perhaps can only be dimly foreshadowed at present, but which will assuredly come more and more into the light in the not very distant future.

Now there is perhaps no subject concerning which the enthusiastic medical officer of health feels more disappointment than with his comparative failure to reduce the rate of infantile mortality. In the face of a continually falling birth-rate, due almost entirely to artificial methods of preventing conception and to the use of abortifacients, much more commonly practised than is generally known, and to the gradually increasing later age at which people get married in supposed conformity to social requirements, this is a very serious matter for the nation. In many districts this has been considerably reduced along with the reduced general death-rate, but by no means in adequate proportion. If any proof of this further than the experience of all of us were needed, perhaps I may be allowed to quote the following from Sir George Newman's most interesting and instructive book on infantile mortality. He says:—"The infantile mortality is not declining Children under 12 months of age die in England to-day, in spite of all our boasted progress, and in spite of an immense improvement in the social and physical life of the people, as greatly as they did 70 years ago. . . . Experience makes it true to say that in England and Wales, out of 100,000 children, 17,139 will not live to their first birthday, and nearly 25,000 will succumb before their fifth, and the nation is suffering a dead loss every year of not less than 120,000 lives under 12 months of age." It will be generally admitted that the chief causes of infantile deaths are (1) Prematurity and congenital defects at birth, including such terms as atrophy, debility, and marasmus, which altogether may be included in the term immaturity at birth; (2) diarrhoeal diseases; (3) respiratory diseases. In regard to measures dealing with the loss of infant life due to diarrhoeal and respiratory diseases, I have nothing to say. They are due to generally well-recognised causes which are being dealt with, and will come more and more under control. But in regard to those deaths due to immaturity there is need for greater consideration. The proportion of deaths from these diseases varies in different districts and in different seasons, but it is generally recognised that on the average 30 per cent. of the total deaths of infants is the result of immaturity. In my own district, for the five years from 1909 to 1914 out of a total of 240 infantile deaths, 103 were the result of immaturity, which represents the high percentage of 42.9. The very great majority of these occur within the

first three months of life; many of them within the first week; many even within a day or two. It is quite evident that no environmental conditions applied to the infant within our present knowledge can have any appreciable effect in diminishing this mortality. To do that we must bring to bear such influences as affect the child in embryo from the time of conception to its birth—that is to say, we must affect the maternal environment of the developing child. We can only do this by discovering what environmental conditions we can bring to bear upon the mother that will bring about a better state of health in her, and through her in the child. This opens up a very wide subject, for it involves a consideration of the whole science of heredity not only as affecting the individual parents, but their ancestry; the transmissibility of disease, as part of the acquired characteristics of the parents; as well as the whole social environment, as regards the home and its surroundings, the conditions of labour, the poverty or affluence of parents, their habits as to morality, vice (especially sexual), alcoholism, and the hundred and one things of everyday social life. Now, apart from the effects of heredity (to which I hope to refer later on) and such conditions as too early marriage and syphilis, for which legislation is as yet premature, there are conditions that affect the mother during pregnancy which are found to influence the health of the child, and which, though they have not hitherto been dealt with, are capable of being so, and are actually now beginning to be dealt with. These refer, for instance, to the industrial employment of women, in which is involved the question of the home and its surroundings, and the poverty or affluence of the parents. As showing the relation of poverty to infantile mortality, Dr. Robinson, medical officer of health for Rotherham, has found that "in those cases in which the mother was employed in a factory, and the father was either out of work or earning less than £1 a week, the mortality rate was 235 per 1,000, while where the father earned more than £1 the rate was only 146 per 1,000." Dr. Robinson adds "that industrial employment has a bad effect on the infantile mortality rate, principally because it interferes with breast-feeding. But the influence of industrial employment is quite small when compared with the influence of acute poverty, and it would seem that in so far as the mother's employment reduces the acuteness of the poverty, it may even tend to lower the

rate of infantile mortality. This is further borne out by statistics in Wigan, where with an infantile mortality of 166 per 1,000 practically no married women are employed in factories, whereas in the town of Nelson, where a very large proportion of the adult female population are so employed, the infantile mortality rate was only 87 per 1,000. Dr. Kerr's annual report just issued bears this out. He finds that the infantile mortality rate high in families living in one-roomed houses, gets less and less with the increase in the number of rooms occupied by families, the number of rooms being an index of the state of poverty or comfort of the parents.

As further showing the influence of poverty, in the city of Edinburgh, while the rate of infantile mortality in 1913 was only 101 per 1,000, with 26 in the Newington Ward and 46 in Morningside, in the Cowgate, occupied by the poorer classes living in narrow lanes and closes, and amidst insanitary surroundings, it was as high as 204 per 1,000. These conditions of poverty, occupation of the mothers in factories, too hard work, and insufficient food, all influence the healthy development of the foetus *in utero* and make it immature at birth, while the hygienic conditions into which it is born are necessarily such as tend to make it lose grip of the little hold of life it has. By the Notification of Births Act, with its array of health visitors and nurses and sanitary officers, directed as they all are to improvement of the environment, the chances of life of these immature children have been greatly increased. But it would be better still if the immaturity with which they are born could be rectified, and consequently the notification of birth implies ante-natal attention, and care of the prospective mother during her pregnancy. This is now claiming the attention of sanitary authorities and boards of health. The National Insurance Act, with the medical benefits it brings to all insured persons, and its maternity benefit, which brings greater comfort and attention to mothers when they most require it, and enables them to stay from work till their health is re-established, tends to assist in reducing infantile mortality, and to render the mother more fit to breast-feed the child by improving her own state of health. But this is not enough. Educated public opinion, always the prelude to further legislation, is becoming more and more convinced of the necessity of preventing mothers engaged in

factories and other works from continuing at their hard work up to the birth of the child. The time is coming soon when prospective mothers will be prohibited from work for two or three months before the time of their lying-up, and for two or three months after it, and when provision will be made to see that mothers are cared for in the way of sufficient nourishment, satisfactory hygienic surroundings, and of being trained in the care of the child, the health of the home, and in all the duties that pertain to motherhood. Even now the Local Government Board has sent out a circular authorising authorities to spend public money in the establishment of maternity hospitals and dispensaries, where without money and without price prospective mothers will be enabled to go for advice and assistance in all matters pertaining to their own and their child's welfare. This is but a corollary to the Notification of Births Act, which has done and is doing a good deal for the welfare of infants; it is but carrying the supervision of the child a little further back in its development to its ante-natal life. Is it not the logical outcome of this to carry it further back still, to its very beginning? And is it ridiculous to look forward to the time when, in accordance with the advanced hygienic views of the time to come, it will be necessary for every prospective mother to send a telegram to the medical officer of health as soon as she herself is aware of her condition? This would bring her at once under the care of the health visitor and medical officer of health, who would be responsible for her welfare till the birth of her child, for her own welfare till her health was re-established, and for the welfare of the child all the time of its infancy and childhood. Records would be kept of the life history of every child from its birth, including such ante-natal observations as were possible till it began its school life. Then it would come under the supervision of the school medical inspector. And this leads me to the medical inspection of school children.

There is no doubt that this is a very important step forward, and already very satisfactory results have been achieved. By means of it deformities are discovered, constitutional defects pointed out, also such conditions as enlarged tonsils and adenoids, diseases of the throat, nose and ears, which have such far-reaching effects, abnormal conditions of the eye, ringworm and skin diseases generally, to say nothing of tubercle in its many forms,

rickets and congenital specific disease. But if the full benefit to the community is to be attained, more inspections than the entering and leaving school will be necessary, and more continuous supervision by an increased number of health visitors. Although the medical inspection of school children and all-time men is another phase of the passing of the general practitioner, it seems to me a pity that it should have been so. His general experience of medical practice, his intimate knowledge of the homes of the people and of the children in their normal surroundings, and of their family histories, gives him advantages that the medical officer of health, without clinical experience, cannot possibly have. The school clinic is the necessary outcome of school medical inspection. The majority of general medical practitioners are too busy to have the time, even if they had the knowledge, which the majority have not, to carry out the expert work required for the treatment of such specialities as eye, ear, and throat disease, and the application of the methods of X-Ray work and bacteriological investigation. But if the actual inspection work may not be done by the part-time man, who is also a general practitioner, I am convinced that the best all-time man and the best expert is the man who has been a general practitioner and made general practice the stepping-stone to a more specialized position. Another large part of practice which has practically passed from the hands of the general practitioner to the medical officer of health is the treatment and control of the infectious diseases. Nowhere has the influence of preventive medicine made itself more felt than in what it has done for these. Some of them—Typhus for instance—has been stamped out. It has simply disappeared by removal of the causes and conditions under which it originated and flourished.

In my student days, during the short period of my dispensary practice, I saw quite a number of cases. Since I graduated the only case I have seen was my own brother, who caught it when dispensary surgeon at Heaton, where it was prevalent at that time, and who died from it over 30 years ago. Although now and again we hear of a case or two here and there, as at Hexham and Newcastle a few years ago, it never gets a hold and soon ceases to exist. Smallpox also has disappeared under general vaccination, and is sooner or later bound to reappear under the want of it, due to ostrich-like policy of the sentimentally-minded British

public. Though plague and cholera are now and again introduced they are under perfect sanitary control and never spread. Enteric fever is diminishing in prevalence and fatality, as also are scarlet fever and diphtheria. In the early days of my professional life both of these diseases gave rise to a state of terror. I have seen three children in one family cut off with scarlet fever, and shortly before I came to Ryton an epidemic had just subsided, and two and three deaths in a house were common experiences, and people mentioned it with awe. Now we seldom have a death from it. Diphtheria also has practically lost its terrors. I have for years been hoping to get through the year without a death. I have not succeeded so far, but that is due to the fact that parents are still incomprehensibly apathetic and ignorant and do not seek medical assistance at once. I still am frequently not called to a child till it is suffocating from laryngeal diphtheria and requires operation at once, but by tracheotomy and antitoxin two-thirds at least of these cases recover. I am convinced that except in the most malignant cases when the nervous centres are overwhelmed by the virulence of the poison, every case treated on the first day would recover. I am unable to understand the mental attitude of those medical men who still refuse to give their patients the benefit of antitoxin treatment.

Whooping cough and measles are, on the other hand, still very fatal, and over them we have apparently very little control, but even from them, according to the report of the chief medical officer of the Local Government Board, the mortality is diminishing.

Of many of the diseases referred to we know the *materies morbi* and the method of its propagation and life history and the manner by which it is spread. We have isolated, for instance, the organism of cholera, of plague, enteric fever, diphtheria, yellow fever, malaria, syphilis, tubercle. We have not yet discovered the organism that causes smallpox, typhus, measles, scarlet fever, but their discovery is merely a question of time and research, and with that discovery will come the cure, and, better still, the method of prevention. Happily, however, the treatment and prevention of these do not altogether depend on that knowledge. Typhus and smallpox have been stamped out without the knowledge of the *materies morbi*. But the successful treatment of diphtheria is the result of such knowledge, and the treatment of enteric, both prophylactic and curative, is in

a fair way of being so. Dr. Kerr recently gave some figures showing the incidence of typhoid fever in the United States Army before and after the introduction of prophylactic inoculation, showing the great value of the method. Sir Almroth Wright, in a letter to *The Times* of September 28th, 1914, shows that in the Boer War, where there were 31,000 cases of enteric fever, among the inoculated there were 66 per cent. less cases and 80 per cent. less deaths; in the Japanese Army, 93 per cent. less cases and 97 less deaths; in the British Army (India), 1912, 80 per cent. less cases and 95 less deaths; in the French Army garrisoning Angou, 100 per cent. less cases and 100 less deaths; and a recently published chart shows that in the United States Army before inoculation there were 536 cases of enteric per 100,000 soldiers and 37 deaths per 100,000. After vaccination became optional the case-rate was reduced to 232 per 100,000 and 16 deaths.

When vaccination was compulsory for the whole year 1912 the case-rate went down to 26 and the death-rate to 3. Last year there were only three cases and no deaths. Surely this is a triumph for preventive medicine, and would be equal to the triumph over smallpox by vaccination were it not that its effects are not permanent like those of vaccination, but only last six months. But not only for prophylactic purposes is typhoid vaccination available.

Anti-typhoid vaccine is being used for curative treatment, and in a circular issued from the War Office (of August 6th, 1914) the advantages claimed from the treatment are the reduction of the case mortality to 4 per cent., the reduction in the severity of the disease, a remarkable freedom from relapses and complications, and more rapid convalescence. It would appear, therefore, as if we were in a fair way to deprive typhoid fever of its terrors.

So again, the knowledge of the causes of such diseases as malaria, yellow fever, plague, Malta fever, sleeping sickness, etc., for centuries a puzzle to medical science, has been ascertained, and by our knowledge of such causes and by the removal of the conditions that favour the propagation and development of the organisms causing them, the destruction of rats, these diseases will in all probability come under control and will eventually disappear.

Apart from the stamping out of infectious diseases by a natural process of decline, as the result of the advance of sanitary methods, as in

typhoid, and by the discovery of vaccination, as in smallpox, the most important preventive measure is the isolation of the patient in an *isolation hospital*. Now, though there has been of late a reaction against the formerly-believed essential importance of isolation hospital, and several writers have given figures to show that isolation hospitals have even increased the prevalence of these diseases rather than diminished it, there can be no doubt that they have served a most important purpose in preventing the spread of disease, and that they still do so.

They are a necessary adjunct to the notification of the infectious disease. But I am willing to believe they are not equally important for all the infectious diseases, and that for some of them they are unnecessary. And I think it may be admitted that they have not had the effect expected of them of preventing infectious disease. *The disappearance of typhus*, for instance, has not been the result of hospital isolation, but is due to the destruction of the rookeries and slums and insanitation of towns.

I used to be taught by Sir Robert Christison in my student days that in the better-class houses it did not spread, and by Dr. Hughes Bennett that it and typhoid could be quite safely treated in the wards of an ordinary hospital. If vaccination and re-vaccination were made compulsory there would be no need for smallpox hospitals. Apart from the germs of the disease in the stools and urine, which can be efficiently dealt with at home, I have never been able to believe in the infectiousness of enteric fever, certainly not in the ordinary way that smallpox and scarlet fever are infectious, and I am not convinced that isolation in a hospital is necessary, especially under a water carriage system. Nor am I satisfied as to the serious infectivity of diphtheria. I have now seen many epidemic visitations of diphtheria in different districts, and even in colliery houses I have been struck with the comparative rarity of a second case in the same house. Seeing that in the early diagnosis of a case of diphtheria a dose of antitoxin is generally followed by disappearance of the membrane in 24 hours, and steady convalescence of the patients, I do not think it necessary to send the patient to an isolation hospital. I believe that isolation of the patient in his home, and the use of an antiseptic gargle, will fulfil all the requirements of preventing a spread of the disease. I am aware,

of course, of the persistence of the microbe in the throat of the patients for weeks, and even months, after their apparent recovery, while all the time they are mixing with the other inmates of the house, yet the occurrence of other cases in the family is practically unknown. A year ago I had two cases of diphtheria of mild type which recovered rapidly after antitoxin. Week by week I had swabs from the throat sent for examination, with the result that they were invariably positive. After three months I determined to ignore the bacilli and let the patients loose to run about for another month and then let them go to school. Nothing happened either among the neighbouring children or in the school.

Scarlet fever has certainly not diminished in prevalence since the isolation hospital came into vogue. In my own district there were more cases last year than for any year of which I have records, with one exception. Yet all cases go who will do so and where the patient cannot be isolated at home. I always now adopt the Milne method of disinfection, and find it fairly successful where an honest attempt is made to carry it out. And it must be remembered that there are a fair number of return cases in families where a child has been to and returned from an isolation hospital. The real cause of the spread of both scarlet fever and diphtheria is not the imperfection of either hospital or home isolation, but it is due to the unrecognised cases that are constantly occurring—children who go to school as usual when they are suffering from a mild attack of the disease which has never been detected, the little patient being scarcely sufficiently out of health to require medical attention. Another difficulty in these cases is that of diagnosis. It is, I am sure, in the experience of all of us—it has certainly been so with myself during the past year—that it is quite impossible in many cases to say whether the patient has scarlet fever or not. We have no bacteriological test to help us out of the difficulty as we have in diphtheria and typhoid and other diseases, and we are apt to put the case down to German measles, or Roseola, or fourth disease, or to admit we have no idea what it is. The peeling of the skin may help us by-and-bye, but there are cases that never peel, and I rather think there are cases that peel that are not scarlet fever.

In regard to *measles* and *whooping cough*, I am afraid we cannot congratulate ourselves in having done much for their effective

control. Measles is somewhat declining in mortality, but whooping cough, according to Dr. Hill's last published annual report, has even slightly increased. Isolation for these diseases is impracticable, and in the absence of accurate knowledge of their cause and inability to prepare a prophylactic serum, the only thing left for us is to attempt to prevent the complications of bronchitis and pneumonia, which are the real causes of their fatality. Even school closing has not been found at all satisfactory in preventive results.

The latest group of diseases that has practically passed from the hands of the general practitioner to the sanitary authority is that of *tuberculosis*. The mortality caused by *tubercular diseases*, though considerably reduced of late years, is still very great, and its prevalence still overwhelming. It causes rather more than one-tenth of the total deaths (107 per 100,000), and tuberculosis of the lungs alone causes 76 deaths per 100,000. And as indicating the widely-spread prevalence of the disease, the application of Von Pirquet's test, which is the most delicate, shows in a total of 2,504 children, that probably 50, 60, 70, or even 96 per cent. suffer, or have at some period of their lives, suffered, from some degree of tuberculosis. In short, very few of us have escaped it altogether. Since the discovery of the tuberculosis bacillus by Koch as the essential factor in the disease, without which it could not exist, and the proof that it was produced by infection, and could therefore be prevented like the other infectious diseases, great efforts have been made to bring it under control, and a regular crusade against it has been set up in the midst of which we are now living. Optimists believe that in the near future it will disappear, and some have even objected to the expense involved by the building of sanatoria on the grounds that within ten years or thereabouts it will be non-existent and the sanatoria therefore unnecessary. The compulsory notification of the disease, the appointment of health visitors and sub-officers, the establishment of dispensaries and sanatoria for the discovery of tuberculous patients in the earliest stages of the disease, their early treatment, have done and are doing a great deal to restore such patients to health; while the educative influences brought to bear on the community as to the infectious nature of the disease, of its dissemination by the dried sputum, leading to those preventive measures by which it can be

controlled, have permeated all classes of the community, and led to a general interest in the subject. All this has been intensified by the special provision in the National Insurance Act for sanatorium benefit and the setting aside of a large sum of money to help in the crusade against tuberculosis. How far all these means are likely to be successful in their object it is, of course, as yet impossible to judge, but it may be doubted, from the results at present available, whether the success is proportionate to the cost. Valuable as sanatorium treatment is for early cases and for those in good social position, whose means enable them to prolong their treatment till ultimate recovery results, I cannot say I have seen any lasting results in those patients among the working classes and of lower social position, who have to return to their homes and their work amidst the surroundings under which the disease was generated. Nor do I think the tuberculosis dispensaries are likely to justify their existence. When treatment by tuberculin was believed to be of supreme importance, general practitioners certainly who knew nothing of the treatment were glad to hand it over to the expert medical officers connected with the dispensaries. But so far as I can gather, treatment by tuberculin is of very doubtful value. I have made many inquiries among friends specially interested in tuberculosis matters, and I have met with none who speak of it with unqualified approval. Some think they have seen benefit from it, some that it does good in suitable cases (but the cases have to be carefully selected), some have given it up as being useless, and some declare that it is actually injurious. And if the dispensaries are not to serve as centres for treatment by tuberculin, it is difficult to see where their advantages come in. Surely the general practitioner is as capable of diagnosing phthisis as the younger and probably less experienced tuberculosis officer, and with county councils providing for the confirmatory bacteriological examination, all the advantages could have been attained by notification, health visitors, and a much smaller number of medical officers. Sanatoria are necessary for the treatment of patients, especially in the early stages, but their practical value is in curative methods. It is impracticable to keep phthisical subjects long enough in a sanatorium to be cured. It means one to two or more years, and it cannot be done. But as a means of teaching patients how to treat themselves after their return

home the time spent in a sanatorium is invaluable—that is, if their homes are such as the treatment can be kept up in. But as such patients have generally to return to work long before they are fit, and as their homes are generally anything but satisfactory, and as they probably have families to provide for, and they cannot get the nourishment required to enable them to resist the disease, they are bound to deteriorate sooner or later, and generally sooner; and the ultimate good is nil. I am a firm believer in the stamping out of tubercle, but it is by the method of prevention. I have little faith in its cure. The causes that give rise to it are well known. Insanitary houses in insanitary districts, with all that it implies, improper and insufficient food, poverty, alcoholic excess, etc., all tend to give the bacillus tuberculosis, which is ubiquitous, its opportunity, and the disease becomes established. The amount of money expended under the Insurance Act on preventive methods, in ameliorating the condition of the working classes, in good sanitary houses, good wages, good food, pure milk, would do more for the stamping out of tuberculosis than the methods adopted.

In regard to the *communicability of phthisis* I think this has been greatly exaggerated. Where a disease has been proved due to an organism it must, of course, be communicable. But its communicability is comparatively easily prevented. In an ordinary well-ventilated house, if the patient has been taught to treat his sputum according to scientific methods and has a room, or even a bed, to himself, the risk of communicating the disease is small, and (though I suppose it is heretical to say so) I do not see the need for tuberculosis hospitals for people to die in, implying, as it does, the removal of the patient from his friends and from the comforts of home in his last days.

Since the discovery of the bacillus tuberculosis as the essential cause of phthisis, the question of heredity has taken a very subordinate place. But I am still convinced that heredity as a factor in phthisis is of profound importance. No doubt its importance in former days was much exaggerated. Now we have gone to the opposite extreme, and pay too little attention to it. But if the stamping out of tubercle is to become a reality the heredity factor will have to be taken into account. To have a good physique, a well-expanded and capacious chest, and unobstructed nasal passages are surely important factors in the preservation

of health, and inimical to the welfare of the bacillus tuberculosis, and as surely are they the result of heredity. On the other hand, a poor physique, an undeveloped chest, a general debility of constitution are favourable to the development of the tuberculosis bacillus, and these are also the result of heredity. How the heredity is to be improved, though essentially a public health matter, is for the present, at any rate, a question for the eugenicist rather than for the medical officer of health.

The next class of diseases that is likely to pass out of the hands of the general practitioner to the sanitary authority is the *venereal diseases*. The general public have become awake to the disastrous consequences of these diseases, and the result is the Royal Commission now taking evidence respecting them. A disease like syphilis has no justification for its existence, though in civil life it is believed that 25 per cent. have become contaminated, and in military life the percentage is much greater. Sir John Collie found among 500 able-bodied men who allowed him to examine their blood 9.2 per cent. gave a positive Wasserman reaction. But the percentage among the Army and Navy men among the 500 was 18, while among the civilians it was only six.

In the out-patient department of the Glasgow Royal Infirmary Dr. McIlroy (*British Medical Journal*, August 8th, 1914) found that when a blood test was taken in every case in which the patient was willing, in the first 100 cases the Wasserman test gave a positive reaction in 43 per cent. As nobody believed the results, 200 more blood tests were made, and at the end of the third hundred the percentage, though somewhat reduced, was still between 30 and 40 per 100.

At present perhaps the time is not ripe for such stringent measures as are necessary for its suppression. But as public opinion regarding it becomes stronger, as it will do with better enlightenment and greater knowledge of its appalling consequences to the individual acquiring it, and to his innocent family, it will be possible to carry out preventive and curative methods that at present appear to be out of the question. The way of prevention is evident, and of all diseases it is perhaps that most readily cured. It only requires the power to carry the measure out. No one, so far as I know, has yet advocated the notification of venereal diseases, though some have suggested some form of voluntary and confidential notification.

It is not so long since there was an outcry, both among the public and the profession, against the notification of tuberculosis, and the Notification of Births Act as being a breach of confidence between doctor and patient. Yet now they are accomplished facts, and any feeling of resentment that existed has entirely disappeared. The notification of syphilis is, of course, a more delicate matter, and the public is not ready for it. At present it would do more harm than good, as it would probably drive the subjects of it into the hands of quacks. Once the public has realised the terrible consequences of the evil, both to the individual, to Society, and to the State, and the necessity for early and complete treatment to a cure, it will not only tolerate such measures as are necessary to cope with the evil and to stamp it out, but will insist on them being carried out. If the State can spend such a large sum of money as it is doing in the stamping out of tuberculosis, it can equally well do the same for syphilis, which probably even more than tuberculosis strikes at the very vitals, both physical and moral, of the human race. Not only would such diseases as general paralysis of the insane, locomotor ataxy, epilepsy to a large extent, imbecility, some forms of melancholia, disappear; but it would affect the infantile mortality by preventing abortions, miscarriages, still-births, marasmus, and the debility that are essentially caused by it. It would prevent the vascular deteriorations, arterio sclerosis, that lead to such diseases as aneurism, angina pectoris, apoplexy, softening of the brain, and some of the insanities. It cannot be too widely known that syphilis is a disease that is fatal to the whole nature of man, and ruins him physically, morally, and intellectually. Once it is known and realised, the State will be forced to legislate for its suppression, and the medical officer of health will have its control added to his duties. How the knowledge of sexual matters is to be brought about, at what age it is to be given, and by whom, whether by parents or teachers or medical men and women, are questions not to be easily solved; but that some kind of instruction should be given most thoughtful people are agreed, and given in such a way as shall lead to ideal morality and purity of life.

Another question that largely concerns the public health and welfare, though it has not hitherto come into the province of the medical

officer of health, or even of the general practitioner, is that of *intemperance*. No one knows better than the general practitioner the vast extent of the evils it causes and the dire effects it has upon the public health, and no one knows better the difficulties to be met in dealing with it. But it concerns the medical officer of health very nearly. For if it could be solved it would lead to a great diminution of the evils with which he has to deal. Syphilis would largely disappear, tuberculosis would diminish, for alcohol, sexual vice, and tuberculosis generally go together. Many of the worst crimes, outrages, murders, etc., would be prevented, and morality and the higher ideals of life would be greatly intensified. It is, of course, largely a social question, but it is also a national question, and more a medical question than is generally recognised, for nothing more than alcoholic intemperance strikes at the root of the nation's health and welfare, both physical and moral.

I have left myself but little time to consider the factor of heredity in the causation of disease. From the point of view of the medical officer of health, it is of secondary importance compared to the environment. But from the point of view of the general practitioner it is of profound importance, and from that of the eugenicist of supreme importance. Practising, as I am now, among the third generation of patients, I am year by year more and more profoundly impressed with the effect and power of heredity. I can see the same physical appearances, resemblances in face, form, features, down to the most trifling details and mannerisms of speech, gait, expression, handwriting, etc., in the children of to-day that I recognised years ago in their parents and grand-parents. I can see the same peculiarities in the symptoms of their illnesses, the same complications, the length of time of their convalescences, the same kinds of diseases occurring at definite ages, and so on. It is a well-known fact that length of years runs in families, and the reverse. An eminent surgeon tells me that, in considering the question of operation in certain serious conditions, he is influenced by the family history as to longevity. He will operate in a person of 70 or over if the patient is of a long-lived family, but not if of a short-lived one. Under apparently similar conditions and with apparently the same chances the one will recover, the other will not. It will be admitted that insanity runs in families. I myself know several in which,

when the time of life comes round, the patient becomes affected, as his parents were before him, with the same mental instability. The same applies to epilepsy, to neurasthenia, hysteria, feeble-mindedness, and other nervous diseases. Cancer, rheumatism, heart disease, all run in families; and I have already stated my belief that tuberculosis is influenced by heredity. I know several families every member of which is an alcoholic, one after another dying prematurely. So there are families with criminal tendencies. There is the well-known record of the Judd family with an extraordinary number of criminals among its members. On the other hand, it is equally known that genius and ability run in families, and Sir Francis Galton's books on hereditary genius and inquiry into human faculty give indisputable facts in proof. I am quite aware, of course, of other explanations that are given to account for such facts as the above, as of phthisis by infection, and alcoholism and crime by the force of example, and of nervous conditions by the stress and worry of life, all these being environmental conditions. But, after making due allowance for all these, and granting them all the importance they undoubtedly have, there is something left behind them all, and that is the inborn tendency, which when it is very strong nothing can quell, and which will assert itself under all circumstances. On the other hand, when not too strong such tendencies can be modified by all those environmental influences, educational, moral, legislative, religious.

You cannot prevent some people from going insane, from becoming alcoholic, from committing crime. The constant reappearances of these in the law courts are proverbial. They are incurable. But though we cannot destroy these tendencies in the individual we can in the race, and after all it is the welfare of the race, the public health and welfare that we as medical officers of health have to deal with, and so eugenics, which is the branch of science that deals with the welfare of the race, must be incorporated with the science of public health if the ideal of the medical officer of health is to be attained.

Now the work of Mendel and the study of Mendelian Inheritance has opened up a way by which this improvement of the race and the disappearance of these degenerative conditions may be effected. All these conditions are intensified by the marriage of persons with similar tendencies, and in various experiments made after Mendelian methods in plants and

animals, mice and observations in human beings, etc., it is found that such conditions reappear in a definite proportion of the offspring. It is evident therefore that the number of degenerates could be largely diminished by preventing "in whatever manner may be practicable, without being harsh or unjust, the reproduction of, for instance, epileptic and feeble-minded persons." And to quote Shuster in his book on eugenics, "By placing the feeble-minded under care of a kind which prevents their propagating, one would not only do something to exterminate feeble-mindedness, but one would at the same time be dealing a blow at tuberculosis, drunkenness, pauperism, prostitution and criminality." This question is, of course, a very large one, and we are very far from being in a position at present to settle it. But seeing that health authorities have begun to make themselves responsible for pre-natal conditions of children, by endeavouring to influence the health of prospective mothers through maternity hospitals and dispensaries, etc., they must logically go further back to the very beginning, and concern themselves with the consideration of the question whether in the interests of the future children, the fathers and mothers are fit to propagate children at all. This opens up a question which is by no means ready for discussion at present, and with more than sufficient work on our hands already, as I am sure we all think, I will spare your feelings by even suggesting now, especially of a kind more difficult and more responsible than any you already have, for it would mean the running of a marriage bureau!

APPOINTMENTS.

DR. PATRICK EDMUND CARROLL has been appointed school medical officer and assistant medical officer of health of Walsall.

DR. ELIZABETH M. EDWARDS has been appointed temporary assistant school medical officer of Aberdeen during the absence of Dr. W. I. Gerrard on naval duty.

DR. WM. GEO. MACDONALD has been appointed school medical officer to the Leeds Education Authority.

DR. ROBERT W. MACPHERSON has been appointed assistant school medical officer of the county of Cheshire.

DR. DOUGLAS MARTIN, Edinburgh, has been appointed assistant school medical officer and assistant medical officer of health of South Shields C.B.

DR. HENRY JOSEPH MILLIGAN, assistant medical officer of health and school medical officer, has been appointed tuberculosis officer and deputy medical officer of health of the borough of Bootle.

DR. MARGARET G. ORMISTON has been appointed assistant school medical officer of Cheshire.

DR. A. S. PERN has been appointed medical officer of health of South Stoneham R.D.

DR. T. W. WADSWORTH has been appointed temporary medical officer of health of the county of Dorset.

WHAT PRECISELY IS THE BENEFIT OF SCHOOL MEDICAL INSPECTION?*

By JOHN PRIESTLEY, M.R.C.S.,
Senior School Medical Inspector, Staffordshire County Council.

I AM very much afraid that when you have listened to the few remarks I have the privilege to address to you, you will think I have led you over some very barren ground and engaged you in a discussion which is merely platitudinous and academic.

The question what precisely is the benefit of school medical inspection does indeed invite to platitude, in some of its aspects at least, and I will, therefore, hasten to dismiss those aspects of the subject as briefly as possible.

The conceivable benefits of medical inspection may be divided into the direct and the indirect—the direct are positive advantages to the child, the indirect are benefits from the educational influence which medical inspection may have on the child's environment.

The environment which may be influenced by medical inspection includes, in the first place, the parent; in the second—but most important of all—the teacher; and, thirdly, the school managers, education committees, and even high mandarins of the Board of Education. In all these cases medical inspection has set going a fermentation—an inoculation of new ideas—which cannot fail to re-act beneficially on the child, and may even have the effect, in the long run, of completely revolutionising educational method.

But I will not dwell on these aspects of the benefits of medical inspection, which, as I say, invite to platitude. I will merely, in passing, emphasise the very peculiar position in this respect of the head teacher in our elementary schools, especially in the country parts.

It is customary to complain that the elementary teacher is a person ill-paid and little regarded. Ill-paid he or she certainly is; but, in spite of this—perhaps even because of this—head teachers are persons by no means of little regard, but, on the contrary, of very potent influence in their neighbourhood. They are persons of trust and consequence, especially to the mothers of their scholars. They are not infrequently teaching the children of their former scholars.

Now, we must not be so simple as to suppose that the school doctor has for the first time brought medical matters into school

* Read before the Midland Branch of the Society of Medical Officers of Health, on November 5th, 1914.

life full-sail; medical matters, and pathological anxieties, and no inconsiderable amount of medical advising have, we may be sure, been going on ever since the first mother took her trembling child to the earliest hedge school.

How could it be otherwise? Maternal anxieties and maternal pre-occupation with the child belong to the oldest instincts of the race; and whenever a mother confides her child to the hands of the pedagogue she longs to tell him what she has observed about its powers, its peculiarities, and its shortcomings. The gain to all concerned from the greater precision of the head teacher's ideas of medical subjects which is coming about from the frequent intercourse with the school doctor will be apparent, and can hardly be over-estimated.

But I do not ask your attention to these benefits; it is the direct benefit I want to discuss. This is the kernel of the question as to the precise benefits of school medical inspection which stands at the head of this paper, and I cannot do better than seek to elucidate the question by asking another: What was expected to be the benefit of medical inspection?

Medical inspection, as you are all aware, came in after the Royal Commission on Physical Training (Scotland) had had its alarming say, and after the country had been gravely discouraged by the reports of the recruiting officers. At that time we were having a bad fit of the blues; the nation was degenerating; we were all attending football matches, and losing our bull-dog grit and tenacity; we were practically on our last legs. The only hope was, first of all, to stop the unfit being born at all; and, in the second place, to catch those not quite bad enough to be scrapped, and rouse whatever dormant vitality still remained by all the means known to scientific medicine.

Medical inspection was to be the first step in the process of regeneration. The chief medical officer of the Board of Education indicated the grand aim in the following words in Cir. 576 (London, 1907), par. 9. He said:—The purpose of medical inspection was the examination "not only of children known or suspected to be weakly or ailing, but of all children in the elementary schools, with a view to adapting and modifying the system of education to the needs and capacities of the child, securing the early detection of unsuspected defects, and checking incipient maladies at their onset."

Thus two things were looked for from medical inspection:—

1. The discovery of conditions handicapping the child in its education and the adaptation of the methods of education to the child's needs and capacities.
2. The discovery of incipient maladies in order that they might be checked at their onset.

Now, these two objects have much in common, but they are widely dissimilar in the amount of time they exact for their successful achievement; and it was some confusion of the two objects which led, in the early stages of the discussion of medical inspection, to a divergence of opinion as to the ideal method.

There were two ideals: one might be called the "well-regulated family ideal," because it is that which is practised in all careful households by intelligent mothers and heads of nurseries. It consists in having a clear picture not only of the state of health of a normal child, but of each child's normal state of health; and then, with this in mind, noting and investigating any case of deviation from the normal. In well-regulated families we do not every few weeks or few months subject every child, whether he is supposed to be healthy or not, to a full panel of specialists; we wait until the child is "not himself," and then we call in a doctor.

The other ideal, advocated strongly, if I remember, by Dr. George Carpenter among others, might be called the "life assurance" ideal. It consisted in putting every child, well or ill, through the most searching examination with all the scrupulous care of a medical referee protecting his insurance company from possible money loss.

Now, it is curious to observe that these two ideals are adapted respectively to the two purposes of medical inspection as set forth by the chief medical officer of the Board of Education. The "well-regulated family" ideal would suffice admirably for the detection of health conditions handicapping the child in its education, and for the rapid segregation and classification of the children so suffering; but Dr. Carpenter was undoubtedly right when he insisted that nothing less than the method which I have ventured to call the "life assurance" ideal would or could suffice for the detection of incipient maladies with a view to checking them at their onset.

The expenditure of time under the "life assurance" ideal would, of course, be immense.

There are six million of children to be undertaken; each must be examined at somewhat frequent intervals, for, of course, a malady might conceivably begin soon after the child had been declared sound. I have tried to imagine the time it would take to examine a child. Think what it means to be in a position to say for certain that a child has no incipient hernia—the standing up, the coughing, the lying down, the dressing and undressing. Or think of the search for enlarged glands, or for incipient scoliosis, or incipient flat-foot. Then the chest and the abdomen must be carefully gone over; the urine; the blood. And then comes the careful testing of the eyes and the ears. It would, I consider, take about thirty minutes to examine a child well on the life assurance scale. In other words, the adoption of this method would involve the increase of existing staffs at least threefold—a step for which I need hardly remind you local authorities are by no means prepared.

Moreover, would it seriously be worth while? In one sense, a very real sense—I am not making light of it—every child's life and health have an unappraisable value; but there are limits to corporate as well as to individual action. If by the expenditure of a large sum of money you confer a great boon on a thousand children, but leave ten unprovided for, would it be justifiable to expend three times that large sum in order to include the ten?

This is a calculating and heartless way of looking at the matter, however, and I am glad we need not draw conclusions in such a callous spirit. Let us grant freely, for the sake of argument, that in certain circumstances the life assurance ideal would pay for itself—that when we come to apply the "life assurance" method to the totality of the child-life of the nation—when our mother and baby clinics and our pre-school clinics are all going, and we have gripped the whole span of life from the cradle to the grave with our inspectorial medical callipers—when, I say, all this is done, let us grant, for the sake of argument, that the vast expenditure involved would amply justify itself; but that is precisely what has not yet arrived. We must never forget that school medical inspection applies only to children *at school*. But this is by no means the totality of children. To say nothing of the children who are too ailing ever to be entered on the rolls, there are all the time about 10 per cent. of absentees. Who are these absentees? They are absent from all sorts of causes, many

not connected with health, of course; but it is clear that the group of absentees is likely to include—not all indeed, but a great part of—the delicate and dubious cases which it is most important to investigate.

The experience of school medical officers as embodied in their annual reports seems to bear out what I say. That experience is based, of course, on an inspection less elaborate than the life assurance ideal, but still the fact is striking. We find a great crop of chronic illnesses and disabilities, many or most of which call for some re-adjustment of educational methods. We find also a certain number of advanced or declared diseases like tuberculosis, but there are extremely few incipient maladies which we can put parents in the way of checking. The reason of this lies on the surface. If we went into our factories and workshops and examined the men and women there, we should indeed find many cases of incipient illness worthy of the greatest effort to check. The need to earn our daily bread, which is such a blessing and healthy discipline in life while we are well, becomes a cruel curse when we are developing maladies. This, happily, does not apply to school life. In the first place, children when they are a little bit poorly quickly lose their courage. If they were older we should probably accuse them of malingering. At any rate, they quickly feel themselves *hors de combat*, and have no objection to show it. Fortunately, too, maternal tenderness is still a most valuable asset of the race; it is often to be found in the most degrading and unpromising circumstances. Under its spur a mother is in most cases quick to detect that a child can do no good at school, and ready enough to keep the child at home. And, lastly, teachers and school attendance officers are nearly as tender-hearted as parents; they soon remark the failing powers of sickening children, and do not in most cases unduly press for attendance.

Thus it happens that the cases in which we are able to plume ourselves on having detected an incipient illness, and checked it at its onset, are extremely few and far between.

In short, if we had adopted the life assurance ideal of medical inspection, we should have constructed a most elaborate and costly machinery, which might possibly have justified itself had it been applicable to the totality of school age, but which is seen to be ponderous, pedantic, and wholly disproportionate to any conceivable success it might have attained,

simply because it could not reach the very stratum it was mainly intended to deal with.

To sum up, therefore:—The direct benefit of school medical inspection is mainly the discovery and classification of a great number of chronic ailments falling within certain narrow limits of definition; they are bad enough to constitute a handicap on the children in their life and education, but they are not bad enough to prevent attendance at school. This discovery and classification is, or ought to be, preparatory to making sure that the ailing children, by one means or another—by the efforts of their parents or, failing that, in other ways—get adequate treatment. Merely to segregate and classify these cases does not call for minute and specialised and time-consuming research, but it does call for a clear idea of the normal limits of health; and constant intercourse with large numbers of healthy children gives one this clear idea.

If in this process of classification a few cases of incipient disease come to light, well and good; but it will be well to recognise not only that this is an incidental and casual item of benefit from school medical inspection as practised to-day, but that in the nature of the case and the very conditions of the problem it never can be a principal benefit. For this benefit we must wait until an all-comprehensive system of medical supervision has been devised, including the children out of school as well as those in.

DISCUSSION.

DR. COWIE complimented Dr. Priestley upon what he considered was a most excellent paper. He (the speaker) said that it was to be expected that a paper from such a well-known school medical officer as Dr. Priestley would be well worth hearing, and he was certain that all the members present had heard the paper with a great deal of interest.

DR. HUGHES said that Dr. Priestley had mentioned several matters which were of great interest at the present time. He (the speaker) said there appeared to be much uncertainty at present as to which authority should deal with the question of making arrangements for the medical supervision of children under school age:—whether it should be the Local Government Board or the Board of Education, and whether the duties prescribed should devolve upon the local Health Committees or the local Education Authorities. He thought that the circulars of the two Boards seemed rather vague. In his opinion, anything in the way of treatment of these children properly belongs

to the Sanitary Authority, and any agencies connected with either the education of mothers or with matters of a similar nature, should be under the supervision of the local Education Authority. With regard to absentees from school, he thought that this was an important problem, and its solution, which appeared to be fairly easy in the case of large towns, lay in the provision of sufficient inspection clinics. At Stoke-on-Trent they had three inspection clinics; and the attendance officers are instructed to follow up many absentees, with a view to their attendance at one or other of the clinics. These clinics are open on certain days in the week. He (the speaker) thought, however, that this procedure would be extremely difficult to carry out in rural districts.

DR. SPENCER BADGER said he thought the inference to be drawn from Dr. Priestley's paper was that school medical inspection was of very little good at all. He (the speaker) thought that medical inspection laboured under many disabilities at the present time. He said that Dr. Priestley had very properly referred to children other than those who attended regularly at school, and he gathered from his remarks concerning children who were on the register but absent at the time of medical inspection, that these children were regarded as being beyond the scope of the present system of medical inspection; but he, personally, did not think this was a correct attitude, and he considered that these children were just as much within the scope of medical inspection as those who attended regularly at school; and he thought that an authority which contents itself in dealing with the children at school only is not doing its duty. He agreed with Dr. Priestley that it is of greater importance to deal with the children who are often away from school than those attending schools regularly. With regard to the medical inspection of children under school age, he thought it was a very debatable point as to what authority should deal with this question. He was under the impression that the Local Government Board preferred that baby clinics should be controlled by the local authorities.

DR. HAMILTON WOOD spoke of the beneficent aid to medical inspection which accrued by the visits of health visitors to the homes of school children who have been found to be defective. During these visits the health visitor comes into contact with pre-school-age children, who derive much benefit from her advice upon feeding, clothing, and other matters which might have a deleterious effect upon their future health. The health visitor also comes into contact with expectant mothers, whom they are able to advise as to their mode of living. Their advice is also beneficial to children who have commenced work. Dr. Wood regretted that there were no definite

measures in force to regulate the supervision of children under school-age. He said that much good work has been done in this connection in areas where health visitors are employed.

DR. ROBERTSON congratulated Dr. Priestley upon his paper, which was, in his opinion, most excellently written, and a masterly exposition of the problem. He (the speaker) said that he had never had any doubt as to the value of school medical inspection. He said that a great many people, including education committees and authorities, imagine that school medical inspection is going to revolutionise the health of the school children very quickly; but he had some doubts about the results being quickly evident. He thought that a period of twenty years would have to elapse before any great results would be forthcoming. It was his opinion that the access which trained medical men now have to mothers and children, cannot but have a beneficial effect.

DR. ORR said that the circulars issued by the Local Government Board and the Board of Education in regard to subjects relating to school children were very conflicting, and had given rise to a considerable amount of friction; he thought that the two Boards should come to terms with a view to laying the whole of the responsibility upon one Board. He said this question ought to be discussed very freely throughout the country, and the necessity of coming to a settlement as soon as possible should be impressed upon both Boards.

DR. STOCKS said that the earliest result of medical inspection had been the tremendous improvement that has occurred in the cleanliness of the children; in his experience the proportion of children examined found to be unclean used to be 30 per cent., and now it is exceptional to find 3 per cent. Dr. Stocks said that great difficulty was experienced in keeping infectious children out of the schools when it became known that the medical inspection of the scholars was in progress.

DR. PETGRAVE JOHNSON said he understood that Dr. Priestley summarised his conclusions by saying that the results of the present system of school medical inspection, might be simply that if the children were discovered suffering from definite ailments, steps could be taken to remedy those ailments; but he (the speaker) was of opinion that the influence of medical inspection was far greater than that, and, although the results at present could not be clearly seen, they must surely be felt in regard to such matters as the cleansing and feeding of school children, also lighting, ventilation, etc. Dr. Johnson criticised the present methods of procedure adopted by the Board of Education and the Local Government Board in regard to the question of child life, and said that sooner or later something would have

to be done to bring the respective work of the two authorities more into harmony.

DR. ASHKENNY congratulated Dr. Priestley upon his paper, and said that many difficulties had been experienced in the work of school medical inspection. Dr. Ashkeny spoke of the necessity for pressing for a Ministry of Health, with the object of organising the health work of the various sections of the Government. He said that all children should come within the scope of medical inspection, whether of pre-school-age or in work in factories.

DR. RIDLEY BAILEY said that he thought the most valuable result of school medical inspection was the education of the lay mind, in the manner in which it brings home to them the importance of maintaining the good health of the children. He thought people were beginning to understand the benefits of school medical inspection, and that it is most important that they should see the value of obtaining immediate treatment for their children.

DR. PRIESTLEY, replying, said that he was surprised to find that some of the speakers thought he was pessimistic in regard to the question of school medical inspection. He said that he really felt a great optimism on the whole question, and was not at all pessimistic as to the good that is being done. He quite agreed with Dr. Robertson that the good done chiefly was the indirect good. He (the speaker) said a great point was that out of all the work that is capable of being done, that of the detection of incipient illness is by far the least. Incipient illnesses handicap the children but do not keep them away from school, and it is quite possible to treat much of this kind of illness in the home. He thought house to house visiting and following up, with the view to attendance at clinics, would bring about the best results. Dr. Priestley said in conclusion, that he was perfectly satisfied as to the good work which medical inspection was doing.

MILITARY APPOINTMENTS.

DR. SYDNEY O. BINGHAM, medical officer of health of Alfreton, now Lieutenant in the Sherwood Foresters.

DR. L. T. CHALLENGER, assistant school medical officer of Leicestershire, now Lieutenant North Midland R.A.M.C.

DR. J. M. CLEMENTS, medical officer of health of Beckenham U.D., now Lieutenant R.A.M.C., on active service.

DR. T. F. DEWAR, Medical Inspector, Local Government Board (Scotland), now Lieut.-Col. R.A.M.C.T., attached to the Highland Division.

DR. J. H. P. GRAHAM, Tuberculosis Officer, Welsh National Memorial, now Major R.A.M.C. (Special Reserves).

DR. J. S. HUDSON, medical officer of health of Mytholmroyd U.D., now Lieutenant R.A.M.C.

FURTHER INVESTIGATIONS INTO THE ETIOLOGY OF WORM NESTS IN CATTLE DUE TO ONCHOCERCA GIBSONI.*

By J. BURTON CLELAND, M.D., Ch.M. (Sydney),
Principal Microbiologist,
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PART I.—GENERAL.

IN the second report of the Government Bureau of Microbiology for the years 1910-11, page 138, reference is made to the presence of worm nests in calves and cattle reared on Milson Island. The importance of this finding is there emphasised because animals which had never left the island have become infected. Unquestionably all the means of transmission of the parasite, including climatic conditions, exist in that small localised and comparatively isolated area. In this same article we reviewed all the possible modes which suggested themselves for the conveyance of the parasite in an immature condition from one bovine host to the next. In summing up, we expressed the opinion that the balance of evidence thus far available favoured the biting fly *Stomoxys calcitrans* as being the insect vector involved. In following up this line of research more particularly, we have not lost sight of the possibility of other means of conveyance, and have directed various researches to test such possible channels.

Though the actual conveyor of the parasite has not yet been clearly established by means of these further researches, the experiments and investigations made have contributed materially to our knowledge of the life history of the parasite, and have strengthened our previous contentions. The more important results that have been obtained may be briefly summarised as follows:—

1. Various Muscidae as well as mosquitoes can ingest the embryo of *Onchocerca gibsoni* when given access to a freshly-opened nodule.
2. In the case of *Stomoxys calcitrans* not only can the embryos be ingested, but they may remain alive and active and in considerable numbers within the alimentary canal in this insect for a period of three days at least. They have not, however, been detected alive after a longer period.
3. In the case of *Musca domestica* and *Musca vetustissima*, both common flies, we find that the embryos can be ingested, but that in the few experiments so far conducted they have not been found alive in the alimentary canal of these insects, even 24 hours after feeding.

* Further Investigations into the Etiology of Worm Nests in Cattle Due to *Onchocerca gibsoni*. Published by direction of the Honourable Littleton E. Groom, Minister of Trade and Customs, Commonwealth of Australia.

4. Embryos of *Onchocerca gibsoni* have been found in a small thickened area in the skin of the belly of a calf (No. 2). This area contained no adult worm, and at the *post-mortem* examination later it was found to be far separated from any worm-nodules. Probably quite 20 or 30 embryos were present in this small area. By teasing a fresh preparation they were found alive and actively motile, and in serial sections they were found at various depths below the surface epithelium, sometimes in a fibrous stroma, sometimes near the root sheaths of hairs. In this situation they were often intricately curled, though sometimes they were in looser loops. Their depth below the surface was in many instances much less than the length of the proboscis of *Stomoxys calcitrans*.
5. Another similar area in front of the shoulder of a cow (No. 11) was pricked, and in the exuding juice an embryo worm was detected.
6. The calf mentioned in "4" above, which had been born on the island, was later killed, and most of the worm-nests were found in a state of degeneration. One or two, however, still contained living embryos. A single embryo was detected in the subcutaneous tissue of the front of the left foreleg by means of a smear made at the *post-mortem* examination.
7. Two bulls (Nos. 4 and 5), which were under experiment at Milson Island, the one for tuberculosis and the other for actinomycosis, both showed at the *post-mortem* examination numerous worm-nodules. In one case these were exceedingly numerous, amounting to at least 135. The nodules were all comparatively small and only a few were degenerated. They contained, in the several instances in which they were examined in a fresh state, active embryos. These animals came from parts of the State in which worm-nests are not considered to be present or, at least, prevalent. Their duration at Milson Island was in each case a little longer than a year. Everything points to their having been thus heavily infected at Milson Island itself. The distribution of these animals on the Island, moreover, supports the view that infection had taken place by means of a biting and flying insect.
8. In one of these bulls (No. 4), a number of embryos were found in smears made from various subcutaneous situations.

In bull No. 5 embryos were found in one subcutaneous situation (the brisket). In calf No. 3 an embryo was found in a smear from the front of the right shoulder. In cow No. 8 an embryo was found in the subcutaneous tissues of the left fore fetlock, and another in a similar situation from the outer aspect of the right stifle. It will thus be seen that in no less than six animals embryos were met with in subcutaneous situations apart from worm-nests, in two instances during life, in five instances (out of seven animals) in which particular search was made) at the *post-mortem*.

9. An *Onchocerca* about 9-in. long was found in the loose tissues of the back part of the knee-joint in a bull (No. 4). This worm was not encapsuled, though a small fibrous nodule was attached to part of it.
10. In one instance (No. 6) a group of three female worms containing living embryos and two males was found loosely coiled near the hip joint. These worms were not surrounded by any increase of fibrous tissue, but portion of another was found embedded in a small lymphatic gland.
11. The portion of a worm embedded in the small gland showed a diameter unquestionably less than the smallest part of an adult male removed from its neighbourhood. This indicates that this particular worm was less developed than its free neighbours. That it had been in this situation in the lymph gland for some considerable time is evidenced by the presence of giant cells surrounding it. It may be thrown out as a suggestion, worth further consideration, that perhaps an early stage of the worm is passed in the lymphatic glands, the embryos reaching these soon after inoculation to the bovine host. After developing to a certain extent the worm may then escape and develop further whilst wandering through the tissues, this particular worm found in sections of the lymph gland being considered as having undergone a pathological arrest. An interesting series of speculations are raised by this finding when we consider the relationship of *Filaria bancrofti* of man to the lymphatic glands of the groin and other areas, and the occurrence of elephantiasis.
12. The possibility of animals acquiring partial immunity to worm-nest infestation, and the possibility of breeds immune to the formation of worm-nests, is referred to in dealing with cow No. 7.

13. An instance has been met with where tuberculosis has been found in juxtaposition to worm-nests in the brisket.
14. Occasional embryos in the wall of a nodule may be thicker than others (No. 1).
15. Three small *Onchocerca* nodules were found in the brisket of a sheep.

Is *Stomoxys Calcitrans* or a Mosquito the Insect Vector?

I have already given my reasons for directing especial attention to *Stomoxys calcitrans*. As indicated, I have been unable to prove that this insect is the intermediate host. The chief item of importance supporting the view was the finding of living embryos, several days after ingestion, in the insect's alimentary tract. No further development of the embryos has been detected in the fly, and all attempts to convey infection by *Stomoxys calcitrans* have so far failed. Such failure cannot be considered as conclusive evidence that *Stomoxys* is not a conveyor, since technical difficulties are great in carrying out the experiments, and the artificial life of the *Stomoxys* is short. It seems to me, however, that further experiments are necessary in connection with this fly. It is almost certain that it is either *Stomoxys calcitrans* or a mosquito which does convey the disease.

The case for the mosquito may perhaps now be briefly stated. Unfortunately, it is an insect which lends itself less to experiment than the *Stomoxys*. Since the embryos would seem to be few in number in the tissues of infected hosts, at least as a general rule, the insect vector must, to insure continuous infection, be numerous, and must be capable of obtaining a considerable amount of blood and tissue juices during its life; the larger size of the *Stomoxys*, of course, gives it a much better chance of ingesting embryos. Mosquitoes, however, are so numerous at times on Milson Island, that their smaller size and consequent smaller amount of blood ingested at a meal may perhaps be compensated for by their prevalence. Of the mosquitoes on the island *Culiseta vigilax* is by far the most numerous, being very abundant in some parts, especially near bushes, at certain periods of the year; within the buildings *Culex fatigans* is numerous, but it seems to confine itself to such situations. Of other mosquitoes *Scutomyia notoscripta* was occasionally found biting by day. The other species found on the island are rare, only a few individuals being met with. It would seem, therefore, that if a mosquito plays any rôle, that mosquito should be *Culiseta vigilax*. *Culiseta vigilax* breeds in salt water as well as in fresh, and is a very persistent biter, especially by day, but also until the dusk of the evening. In some parts of the island we have been much annoyed by the bitings of this mosquito, and places where it has been especially prevalent were where

the two bulls were confined for most of their time. It will be remembered that these animals were very heavily infested.

From these remarks it will be seen that, in my opinion, either *Stomoxys calcitrans* or *Culicella vigilax* is the insect vector of which we are in search. The failure of my efforts to transmit the disease by *Stomoxys* inclines me to think that the mosquito is the host, and further efforts should, I think, be directed to prove or disprove such a view. Though I consider the preponderance of evidence is slightly in favour of *Culicella vigilax*, I by no means consider that as yet *Stomoxys calcitrans* has been excluded.

It is interesting to note that Leiper has recently found that the biting fly *Chrysops* is the intermediate host of *Filaria loa*. The embryos of *Filaria loa* are found in the blood by day, and are known as *Microfilaria diurna*. Such a finding, of course, swings the pendulum again slightly in favour of *Stomoxys calcitrans*.

Suggested Life History of *Onchocerca gibsoni*.

From the data accumulated, more especially the recent findings mentioned later in this paper, the following seems to me to be the probable life history of *Onchocerca gibsoni*.

By means of a biting insect, either *Stomoxys calcitrans* or *Culicella vigilax*, embryos are ingested from the bovine host. In the insect a certain stage of development takes place, and eventually the partly-developed worm or worms are injected into the subcutaneous tissue of the new bovine host. I think it is probable that several developing worms are often injected together, having been originally ingested at the same time by the one insect host. Having reached the subcutaneous tissue, the young worms start on their migrations, and incidentally increase in size. Probably their own active movements combined with the muscular contractions of the host and the onward flow of lymph, determine a progressively upward movement from the lower parts of the limbs (if there injected) towards the body. Thus if the worms were injected into the lower parts of the hind legs, they would tend to work upwards past the knees and round the side of the body towards the front of the belly. Here they could pass underneath the various muscular planes, which would account for their presence beneath or between the oblique muscles and the muscular masses entering the brisket. From the fore-limbs they might similarly reach the brisket area. That the worms are intended to migrate through the tissues, and that such migration is of value in the perpetuation of the species, is, I think, evidenced by the spiral rings which pass round the body, and which are obviously of assistance in preventing the animal, after it has moved forward, from being forced back again. That the course of migration may

be from the bottoms of the legs upwards towards the body, is suggested by the fact that in one instance I have found an *Onchocerca*, about 1 1/2 inches long, attached to and partly embedded in a small fibrous nodule about the size of half a split pea in the loose tissues at the back of the knee-joint. In another instance I met with a bunch of worms, consisting of three females and two males, loosely coiled together in the tissues near the hip-joint, portion of another worm being embedded in a lymphatic gland, but the whole mass not being surrounded by any unusual amount of fibrous tissues. In addition to these findings of unencapsulated worms, in one instance a worm-nodule was found in the subcutaneous tissue near the knee, and in several instances they have been found deeply embedded near the hip-joint. These occurrences suggest that the various worms concerned were on their passage from the lower part of the leg towards the body, but, for some reason or other, had been arrested before having reached their usual destination. How such an arrest can take place may be instanced in the case where portion of a worm was found embedded in a small lymphatic gland near the hip-joint. It is possible that this worm was moving in the lymph stream, having gained entrance into the lymph channels, and that the flow of lymph had carried it into the sinuses of the lymphatic gland from which it had been unable to escape. That it had been in this neighbourhood for some time was evidenced by the presence of a few foreign-body giant cells immediately around it. The possibility that an early stage of development may take place in the lymphatic glands must be borne in mind. This worm, or worms, was accompanied by several others, and it seems possible that the arrest of one member of this group had led, by its entanglement with its fellows, to the stoppage of them all. This little group of practically free worms is of considerable importance, because not only was the group as a whole not surrounded by any increase of fibrous tissue, but also its female members had living and actively motile embryos present in them, and even projecting from the vagina; the worms, in fact, had reached maturity although they were entirely unencapsulated. This raises the interesting point as to whether encapsulation is or is not a normal process in the life history of *Onchocerca gibsoni*. In our earliest announcements on the subject we suggested that perhaps the formation of a worm-nest was actually an accident in the life history, and this finding supports that contention; in fact, I think it highly likely that *Onchocerca gibsoni*, like *Filaria loa*, normally wanders through the subcutaneous tissues, depositing from time to time during its progress living embryos in the tissues through which it migrates. Such deposits of embryos would account for their being found from time to time in the skin, and

especially for the instance in which a number were found in a small swelling in the belly of a calf far removed from encapsulated worms. It is probable that embryos so liberated, by means of toxic products, cause a certain amount of swelling; and that this may eventually lead to some degree of fibrosis. When for some reason or other the adult worm gets arrested, and probably during its wanderings it is more likely to be arrested in some situations, for example the brisket, than in others, then the embryos which still continue to be liberated, produce a re-action in the surrounding tissues, so that eventually the worm becomes encapsulated in a dense fibrous mass which increases in size as time goes on. Probably, in the early stages of such encapsulation, embryos may still escape, but eventually the fibrosis becomes so dense that none can find their way through, and the worm degenerates through the cutting off of its food supplies. The embryos themselves may appear in the tissues in one of two ways, either having been deposited during the migrations of unencapsulated worms, or after having escaped from a developing worm-nest before its capsule has become too dense. In the former instance the young worms may be deposited in situations where biting insects have easy access to them, whilst in the other, the active movements of the embryos would probably eventually lead to a certain number of them occupying suitable positions for ingestion by insect hosts. It is possible that even in an early stage the slight difference in size noted represents the difference in sex. The life cycle would be completed by the ingestion of these embryos from the subcutaneous tissues by the intermediate host, and it is probable, if migrating worms are the source of most of the embryos in the skin, that several embryos might frequently be ingested at the one time.

I would suggest that future investigations might with advantage be directed along some of the following lines:—

1. Further experiments with *Stomoxys calcitrans* to ascertain—
 - (a) Whether wild flies in affected districts can transmit the embryos.
 - (b) Whether caged flies can be artificially infected and then transmit the embryos.
2. Similar experiments with *Culicella vigilax*.
3. Immunity experiments to ascertain whether the injections of emulsions of adult worms can play any part in conferring immunity on calves. This possibility is suggested by cases (mentioned in this Report) where adult animals, exposed to frequent chances of infection, have on *post-mortem* examination shown only a few worm-nests—and those often degenerated.

4. Systematic examinations of lymphatic glands, especially those draining the hind-legs, to ascertain the presence or absence in them of developing worms.

PART II.—SPECIAL INVESTIGATIONS AND EXPERIMENTS.

The following are details of the particular investigations and experiments carried out.

1. Investigations and experiments into the rôle possibly played by biting diptera.

(a) *Stomoxys calcitrans*.—As already indicated, our attention has been especially focussed on the possible part played by the stable fly, *Stomoxys calcitrans*, in the transmission of bovine Onchocerciasis. This fly is comparatively abundant at Milson Island, and we have encountered it wherever we have searched for it in various parts of New South Wales, in Melbourne, Adelaide, and Perth. The fly is almost certainly an introduction from overseas like *Musca domestica*, and we have little doubt that it is more or less uniformly distributed throughout Australia wherever man and his associates, cattle and horses, have so far roamed. Its suggested rôle as a vector in the transmission of this disease would be very materially shaken if it could be shown that in any part of Australia where bovine Onchocerciasis is prevalent this fly does not exist. Investigators might bear this point in mind, and all observations of its presence in various localities should in some way be made public. The presumed wide prevalence of this insect is, therefore, in support of the view we propounded. If any other insect or other metazoan is the intermediate host or mechanical vector of the disease, then such must be found both in Northern Queensland and on the Hawkesbury River, near Sydney.

The habits of *Stomoxys calcitrans* are of importance in considering its claim. For a period of a year we have kept a more or less close observation on its numbers at Milson Island and in Sydney. These indicate that the insect may be obtained in the act of biting animals all the year round, even during our winter months. A general impression, however, has been left upon us that in times of drought it is less abundant, and that it increases in numbers after rains, especially those of the late summer and autumn. In the neighbourhood of dairies, large numbers of these insects, replete with blood and sluggish from surfeit, may be seen resting

in the sun, along fences, on barn doors, etc. Their attacks on horses and cattle make the animals very restive, and would seem to be the chief cause of the continual swishing of their tails. Horses unaccustomed to their attacks, and unable to protect themselves from the bites when in harness, are apt to become very restive and almost unmanageable. Man is not infrequently bitten. It would seem, however, that cattle and horses are preferred, and that attack is as a rule only made on man when these animals are scarce. The bite on man is usually an indefinite sharp prick, and in most instances the victim imagines that he is bitten by the ordinary domestic fly — an impossibility. The pricking sensation, of course, is at once followed by the driving away or destruction of the fly. Should the insect be allowed to bite deeper, I have found from personal experience that the bite is one of very considerable pain.

In watching these insects feeding upon both horses and cattle, it is at once noticed that the lower parts of the legs of the animals constitute one of their chief feeding grounds. In addition, they are fairly frequently seen on the brisket region, and with bulls on the scrotal surface. They often also settle on the flanks and sides. In catching specimens on living animals for examination, we have always found that the dependent parts, especially the legs, were the most fruitful spots. This preference of the fly for the lower parts of the legs has assumed some etiological importance owing to one of the sites of location of worm-nests being behind the neck of the femur. In addition, in the case of one of the bulls, an *Onchocerca* about 11 inches long was found partly surrounded by a fibrous stroma in the loose tissue at the back of the knee-joint. These various situations are strongly suggestive of the embryo worms being injected by some insect host at the lower parts of the legs, and thence finding their way gradually upwards, making for the site of selection for nodules in the brisket region. The worm that we found in the knee-joint would, under this view, be one that in its wanderings had gone astray, had caused irritation to surrounding tissues, and finally had become partly surrounded by a fibrous stroma which prevented any further progress. A few worm-nests, and even free worms, sometimes

found in the back of the thigh deep under the muscles, instances of which are given later in the cases of one of the bulls and a calf, may be further examples in which the worms had again lost their way and become imprisoned. It will be seen that if there is a tendency for the worms to gain entrance in the way suggested, they may pass up the back of the leg, possibly somewhat deeply, and then round the flanks towards the ventral surface of the animal, finally burrowing under the pectoral muscles and the external obliques, where they eventually in so many instances come to rest, or in other cases gaining a more superficial position in the tissues of the brisket. Of course it may happen that the worms in the brisket area travel up in similar fashion from the forelegs. At any rate it seems to us a significant factor that *Stomoxys calcitrans* specially bites the lower parts of the legs of cattle, and that worm-nests may be detected on the direct road, in the case of the hind-legs, from this situation to the brisket. If *Stomoxys calcitrans* is the intermediate host for *Onchocerca gibsoni*, it is quite possible that it plays a similar rôle in the etiology of *Onchocerca reticulata* of the horse, which is so frequently found in the neighbourhood of the joints.

On the supposition that *Stomoxys calcitrans* may be the insect vector, it naturally occurred to us to try whether this fly could be infected by allowing it to feed upon worm-nests, containing living embryos, which had been cut open. Our object was to see first of all whether living embryos were ingested, and, if so, for how long a period they could be found alive within the fly; secondly, to see whether any further development of them could be found in any portion of the fly, which might be taken as parallel to the development of filarial embryos in various mosquitoes; and, thirdly, whether flies thus fed could be made to infect a calf kept in a fly-proof cage.

We devised experiments to ascertain the above points, bearing in mind, however, that it was possible that the embryos as found in an open worm-nest were not as yet sufficiently mature to be able to develop any further in an insect host. It seemed to us possible that the embryo worms that escaped from the worm-nests in a living animal had to mature further during their wanderings towards the surface before they could

infect such insect host. Our experiments were, therefore, based on the hope that no such further development of the embryos occurred in the bovine host.

Experiments to Test the Length of Life of Embryos Ingested by Stomoxys Calcitrans.

From May, 1912, to December, 1912, a large number of *Stomoxys calcitrans* were caught, chiefly at the abattoirs at Glebe Island, Sydney, and kept in fly-proof cages. The flies were as soon as possible fed on fresh worm-nests obtained from the abattoirs, which were cut open and placed in watch glasses in the cage. If the insects were replete with blood few of them would immediately feed upon the worm-nests. However, upon starvation for 24 hours, they readily flew down upon and ingested the juice from freshly-opened nests. Having obtained their fill in this way it was necessary to keep the insects alive as long as possible on blood. They were therefore fed in the majority of instances daily upon guinea-pigs. On these animals they fed well, and though there was a heavy mortality from confinement, a fair number of flies lived several days, one even as long as eighteen days. This feeding upon guinea-pigs' blood suggested naturally the possibility that such blood might injure embryo worms which had been ingested, whose natural habitat was in the tissues of the ox and of some insect feeding on the ox. In one or two instances flies were fed for several days on an ox, but in the ordinary course of events this practice was not possible. Living embryos were found on several occasions in flies one day after feeding on an open nodule, in one case nine or ten living embryos were found in a fly two days after thus feeding, and in another instance about 60 live embryos were found three days after feeding. In those flies which survived longer periods, living embryos were not found. The search for living embryos was made by carefully teasing the various parts of the fly in normal saline solution, and then examining under the microscope. It is possible, of course, that embryos, quiescent and undergoing growth, escaped detection amongst muscular masses, etc., in the careful search that was made. The small number of flies which survived a period of a week, during which some development might have

occurred, must also be considered. It would appear from these experiments that *Stomoxys calcitrans* can ingest living embryos of *Onchocerca gibsoni*, and that these may be found alive in some instances within the fly for as long as three clear days after ingestion. Thereafter, however, they have not been found alive, though in one case five days after feeding embryos enclosed still in the egg were noted.

The fact that living embryos could be found in *Stomoxys calcitrans*, up to three days after ingestion, is allied to the question as to whether they can exist for such a period of time in other flies. A few experimental investigations on *Musca domestica* and *Musca vetustissima* are referred to. Though dead embryos could be found with ease in flies which were fed one or two days previously on worm-nests, no living embryos were detected. Though the experiments are few they would seem to suggest that the embryos found a more congenial medium in the alimentary canal of *Stomoxys calcitrans* than in that of the other two species.

BORAX AS A LARVAECIDE.

JUST as all rational mosquito extermination work aims to prevent the breeding of these pests, so work directed against the extermination of flies should be directed principally against fly breeding. It is now well established that the house fly breeds mainly in horse manure, though if this is not available garbage and other refuse are made to serve the purpose. The United States Department of Agriculture has recently carried on a series of tests to discover a method of treating manure so as to kill fly larvae. Among the substances tested were kerosene, iron sulphate, potassium cyanide, formaldehyde, calcium cyanamid, pyroligneous acid, common salt, copper sulphate, lime-sulphur mixture, Paris green, sodium fluorid, several proprietary disinfectants and borax. In passing on the utility of the substances mentioned three factors were considered essential:—1, destructive action on fly larvae; 2, non-injurious effect on manure; 3, lack of extremely poisonous properties.

By far the most effective, economical, and practical of all the substances tested is borax in the commercial form in which it is available throughout the country. In using borax as a larvaecide the following general directions should be observed.

Apply one pound of borax to every 12 bushels (15 cubic feet) of manure immediately on its removal from the barn. The borax should be applied particularly around the outer edges of the pile with a flour sifter or other fine sieve, after which two or three gallons of water should be sprinkled over the borax-treated manure.

Those desiring to learn further details of this method of killing fly larvae are referred to Bulletin No. 118, United States Department of Agriculture, July 14th, 1914.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED 1888.
INCORPORATED 1892.

Southern Branch.—A meeting was held at the Council Offices, Eastleigh, at 2.30 p.m., on Friday, December 4th, 1914. There were present: Dr. Legate (in the chair), Drs. Loveless, Hoyle, Fenton, Hutt, Forbes, Stephens, Norman, Nankivell, Willoughby, Blake, Bartlett, Livingstone, Hamilton, Walker, Lauder, Wilshaw, Wilkes, Lyster, and Fraser (Acting Hon. Sec.).

The meeting of the last meeting were read and confirmed.

Notices of regret for absence from the meeting were announced from Drs. Gibson, Butcher, Stott, Maturin, and Maples.

DR. WILLOUGHBY proposed, DR. LAUDER seconded, and it was resolved, that a hearty vote of thanks be accorded to Dr. Duncan Forbes for his services as Chairman during the last session. DR. FORBES acknowledged this vote in a few words.

DR. WILSHAW then moved the following resolution, of which he had given notice:—"That the resolution passed at the last meeting deciding to make application to the Council for the division of the Southern Branch into two be rescinded." This was seconded by DR. WILLOUGHBY. After discussion, in which a number of members took part, the CHAIRMAN put the resolution to the vote, and it was declared lost. It was proposed by DR. WALKER, seconded by DR. LAUDER, and resolved, that the numbers of the votes be recorded. These were 10 for the resolution, 10 against, and the Chairman gave his casting vote against, making the votes—11 against, 10 for.

DR. LYSTER then moved the resolution of which he had given notice:—"That the resolution passed at the last meeting, dealing with the composition of the sub-committee appointed to prepare the case for the division of the Branch be rescinded." This was seconded by DR. LAUDER. On being put to a vote the resolution was lost.

Dr. Lyster withdrew the motion on the agenda of which he had given notice, dealing with the payment of travelling expenses by the Branch.

On the question of the report of the special sub-committee appointed to prepare the case for the division of the Branch, DR. FRASER proposed that it be not accepted, for the reason that he had not had sufficient notice to enable him to attend the meeting at which it was prepared. This was seconded by DR. FORBES. DR. WILLOUGHBY proposed as an amendment that the report be prepared by the sub-committee and presented at the next meeting of the Branch. This was seconded by DR. LAUDER. The amendment was carried.

It was decided to leave it to the Chairman to fix the place for the next meeting.

Owing to the lateness of the hour, it was decided to postpone the discussion on building bye-laws to the next meeting.

Midland Branch.—A meeting of this Branch was held at the Council House, Birmingham, on December 3rd, at 3.30 p.m. Present: Dr. J. M. Cowie (in the chair), Drs. A. Bostock Hill, S. Barwise, A. H. Newton, R. W. Stocks, C. E. Tangye, H. Gibbons Ward, T. Ridley Bailey, George Reid, J. A. Codd, James Robertson, W. H. Davison, A. Hamilton Wood, H. M. Cargin, Herbert Jones, and E. H. Snell. Apologies for absence were received from Drs. Henry May and Mabyn Read.

MAJOR GEORGE REID, R.A.M.C., I.F., opened an interesting discussion on the question of the co-operation of military and civil medical officers in districts where troops are stationed. The following took part in the discussion:—The President of the Society (Major Herbert Jones, R.A.M.C., I.F.), Drs. Gibbons Ward, J. M. Cowie, Bostock Hill, Major Barwise, E. H. Snell, James Robertson, and R. W. Stocks, and Major Reid replied.

LAW REPORTS.

HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.

November 19th, 1914.

(BEFORE RIDLEY, AVORY, AND LUSH, JJ.)

WINTERBOTTOM v. ALLWOOD.

Sale of Food and Drugs Acts—Sardines in Olive Oil—Oil Adulterated—Sealing of Parts of Sample.

If a purchaser ask for "sardines in olive oil" and is supplied with sardines in a mixture of olive and cotton-seed oil, there is a sale of an article not of the nature and substance and quality demanded and to the prejudice of the purchaser.

In sealing up the third parts of the sample taken care should be taken to prevent deterioration, but there is no requirement that the parts should be so sealed as to render them capable of analysis at the date of the service of the summons or at the hearing.

This was a case stated on the hearing of an information laid for an offence under sect. 6 of the Sale of Food and Drugs Act, 1875. The article demanded was "sardines in olive oil." The appellant supplied tins of sardines known as "Five O'clock Tea," and on each tin was a label stating that the tins contained sardines in pure olive oil.

The purchaser, an inspector, opened the tins, and divided their contents into three parts. Each part was placed in a jar, the top of which the

inspector covered with grease-proof paper, and securely sealed it.

The purchase was made on February 12th, 1914, and on the same day one jar was handed to the public analyst for analysis. He certified that the sample contained 19 per cent. of cotton-seed oil. On March 17th the appellant sent his jar to be analysed, but, owing to the condition of the contents, this was found impossible. The information came on for hearing on April 1st, when the magistrate sent the third jar to the Inland Revenue analysts, who also stated that, owing to the state of the contents, they could not make an effective analysis.

Two points were taken (1) that there was no rule to the prejudice of the purchaser because there was no evidence that cotton-seed oil was prejudicial to health, and (2) that sect. 14 of the Sale of Food and Drugs Act, 1875, had not been complied with, inasmuch as the parts were not in a condition to be analysed either at the date of the service of the summons or at the hearing.

The magistrate convicted, and the Court dismissed the appeal.

Sect. 14 of the Sale of Food and Drugs Act, 1875, enacts that the purchaser for analysis shall "divide the article into three parts, to be then and there separated and each part to be marked and sealed or fastened up in such manner as its nature will permit."

RIDLEY, J., said that the article asked for was not sardines, but sardines in olive oil. The purchaser got sardines in cotton-seed oil, which had been substituted for olive oil, and this was not the article demanded, and was to the prejudice of the purchaser.

On the second point he was of opinion that the samples were sealed up as the nature of the substance permitted. There was nothing in the section requiring the article to be sealed up so as to be imperishable and capable of analysis either at the date of the service of the summons or at the date of the hearing.

AVORY, J., concurred.

LUSH, J., also concurred, and stated that the purchaser should in sealing up the samples take reasonable care that analysis should be possible when required.

November 26th, 1914.

(BEFORE RIDLEY, AVORY, AND LUSH, JJ.)

MCNAIR v. TERRONI.

Sale of Food and Drugs Acts—Refusal to Sell Sample—Milk to be Mixed with Tea, etc.

An inspector under the Sale of Food and Drugs Acts is entitled to receive, if he requires it, a sample of food exposed for sale, such as milk, although such food is only sold when mixed with some other article of food, such as tea.

This was a case stated in reference to an information laid against the respondent for refusing to sell a sample of milk exposed for sale. The information was laid under sect. 17 of the Sale of Food and Drugs Act, 1875, which provides that if an inspector "shall apply to purchase any article of food or any drug exposed for sale, or on sale by retail," and shall tender the price, "and the person exposing the same for sale shall refuse to sell the same," such person shall be liable to a penalty.

The respondent was the owner of a restaurant, and on his counter stood a bowl which was labelled "pure milk." The inspector—the appellant—called at the restaurant, and asked to purchase a sample of the milk in this bowl. The attendant in charge refused to sell any of the milk, as he had been told never to sell milk by itself. Milk was only used in the restaurant to mix with tea, coffee, and such things.

The magistrate dismissed the summons, as he was of opinion that under the circumstances the milk was not exposed for sale within the meaning of the section. He also refused to state a case for the opinion of the Court of King's Bench.

The appellant thereupon applied to the High Court for a *mandamus* requiring the magistrate to state a case, and the *mandamus* was granted.

The High Court now allowed the appeal, and remitted the case to the magistrate for conviction.

RIDLEY, J., said that the article was nevertheless exposed for sale, although it was only sold when mixed with something else.

AVORY, J., concurred, and said that if the magistrate's view was upheld, then butter sold to be eaten with bread in a shop would also be exempt.

LUSH, J., also concurred.

RECENT PUBLIC HEALTH LITERATURE.

Abortion in Cattle.

BUXTON (J. B.) Some further experiments in the prevention of epizotic abortion. *Veterinary Journal*, 1914, lxx, 507.

Alcoholism.

CARTER (D.). Alcoholism as a factor in disease. *Medical Record*, N.Y., 1914, lxxxvi, 666.—RYLE (R. J.). The habitual inebriate. *Proc. Brighton and Sussex Med.-Chir. Socy.*, 1913-14, p. 21.—*Idem*. The law and the inebriate. *Proc. Brighton and Med.-Chir. Socy.*, 1913-14, p. 102.

Beri-beri.

STRONG (W. M.). Beri-beri in Papua (British New Guinea). *Journ. Trop. Med.*, 1914, xvii, 310.

Cancer.

BUCKLEY (L. D.). The relation of diet to cancer. *Med. Record*, N.Y., 1914, lxxxvi, 699.—LITTLE (S. W.). A further study of cancer. *Boston M. and S. Journ.*, 1914, clxxi, 587.

Diphtheria.

DYKES (A. L.). The incidence of diphtheria in relation to defective drainage. *Med. Press*, 1914, ii, 427.

Feeble-minded.

SAVAGE (SIR G. H.). The feeble-minded and their care. *Clin. Journ.*, 1914, xliii, 545.

Food.

SOMMERVILLE (D.). Foodstuffs. *Internat. Clinics*, 1914, iii, 84.

Gastro-intestinal Disease.

HELMHOLZ (H. F.). The relation of heat to the morbidity and mortality of infants from gastro-intestinal diseases. *Journ. Amer. Med. Assoc.*, 1914, lxiii, 1,371.

Gunshot Wounds.

OSLER (SIR W.). An address on bacilli and bullets. *Med. Magazine*, 1914, xxiii, 580.

Health Resorts.

FOX (R. F.). The choice of winter health resorts. *Practitioner*, 1914, xciii, 690.

Heredity.

TIMINE (A. R.). The hereditary basis of eugenics. *Cleveland Med. Journ.*, 1914, xiii, 595.

Infants, Care of.

CHAPLIN (H. D.). The physician's field in infant feeding. *Journ. Amer. Med. Assoc.*, 1914, lxiii, 1,179.—POOLER (H. W.). The effect of income on nursing capacity and infant growth. *Pediatrics*, 1914, xxvi, 490.

Infectious Diseases.

DOTY (A. H.). The means by which infectious diseases are transmitted and disinfection. *Med. Record*, N.Y., 1914, lxxxvi, 657.

Leishmaniasis.

LINDSAY (J. W.). American forestal Leishmaniasis. *Trans. Socy. Trop. Med. and Hyg.*, 1914, vii, 259.

Malaria.

HODGSON (E. C.). A preliminary note on malaria in Madras City. *Indian Journ. Med. Research*, 1913-14, I, 702.—HEHIR (COL. P.). Prevention of malaria in the troops of our Indian Empire. *Indian Med. Gaz.*, 1914, xlix, 375.—HEHIR (COL. P.). Prevention of malaria in the troops of our Indian Empire. *Journ. Trop. Med.*, 1914, xvii, 296.—DEADERICK (W. H.). Malaria carriers. *Internat. Clinics*, 1914, iii, 62.—JAMES (MAJ. S. P.). Mosquito work in Ceylon. *Trans. Socy. Trop. Med. and Hyg.*, 1914, vii, 225. Discussion, p. 243.—SMART (A. G. H.). Epidemic malaria and construction works. *Trans. Socy. Trop. Med. and Hyg.*, 1914, vii, 251.

Meat.

WEINZIRL (J.) and NEWTON (E. B.). Bacteriological analysis of Hamburger steak with reference to sanitary standards. *Amer. Journ. Pub. Health*, 1914, iv, 413.

Meat Inspection.

YOUNG (T. S.). Abstract from the report on his visit to the Argentine Republic in connection with the inspection of meat in that country. *Veterinary Journ.*, 1914, lxx, 522.

Military Sanitation.

BRYETT (L. T. F.). Sanitary organisation of the territorial force. *Med. Magazine*, 1914, xxiii, 521.

Milk.

BEATTIE (J. M.). The microscopical examination of milk for B. tuberculosis. *Liverpool Med.-Chir. Journ.*, 1914, xxxiv, 376.—CAPPS (J. A.) and DAVIS (D. J.). The relationship of septic sore throat to infected milk. *Journ. Infect. Dis.*, 1914, xv, 130.—HOLM (M. L.). A safe milk supply for summer resorts. *Public Health*, Michigan, 1914, N.S. ii, 203. TITUS (E. W.). Cow's milk, raw and heated. *Med. Record*, N.Y., 1914, lxxxvi, 58.—FORD (W. W.) and PRYOR (J. C.). Observations upon the bacteria found in milk heated to various temperatures. *Bull-Johns Hopkins Hosp.*, 1914, xxv, 255.—PRYOR (J. C.). On the presence of spore-bearing bacteria in Washington market-milk. *Bull-Johns Hopkins Hosp.*, 1914, xxx, 276.—VON PIRQUET and OTHERS. Infection dangers in milk. *Med. Magazine*, 1914, xxiii, 461.—DAVIS (D. J.). The growth and viability of streptococci of bovine and human origin in milk and milk products. *Journ. Infect. Dis.*, 1914, xv, 378.—DELÉPINE (S.). The milk-supply as a casual factor in relation to tuberculosis. *Brit. Journ. Tubercle*, 1914, viii, 195.—JONES (H. M.). The bacteriological and chemical evidence of a hexose sugar in normal milk. *Journ. Infect. Dis.*, 1914, xv, 357.—McCRAE (J.). Abnormal refraction of milk serum. *Ana'y.t. Lond.*, 1914, xxxix, 221.—RICHMOND (N. D.). The composition of milk and milk products. *Analyst*, Lond., 1914, xxxix, 243.—LLOYD (H.). How Toronto controls her milk supply. *Canad. Pract. and Rev.*, 1914, xxxix, 593.—MANN (H. H.). The supply of milk to Indian cities. *Indian Journ. Med. Research*, Suppl., 1914, iii, 172.

Mortality, Infantile.

MUSGRAVE (W. E.). Infant mortality in the Philippine Islands. *Philippine Journ. Sci.*, 1914, B. viii, 459.—TROTTER (G. C.). Co-ordination in administrative methods in dealing with infection and infantile mortality. *Med. Press*, 1914, ii, 117.

Public Health

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PUBLIC HEALTH ADMINISTRATION.

TWO annual reports always welcomed by medical officers of health have been recently published, the one the report of the Medical Officer of the Local Government Board for the year 1913-14, the other the report of the Chief Medical Officer of the Board of Education for the year 1913. In some degree the same subject-matter is discussed in both reports. They both aim at the prevention of disease but they approach the subject from different standpoints.

It is impossible to read these reports without speculating upon the future of public health administration. The same problem presents itself now as that which had to be considered when the Local Government Board was constituted. Administration having as its object the promotion of the public health touches upon other subjects with which the State is definitely concerned. Years ago the question under consideration was what relationship should exist between sanitary and poor law administration. As we know, the supervision of both branches of work was entrusted to the same Government department, but the two administrations are distinct. More recently the Education Authorities have become concerned with duties which are of large importance in their relation to the public health. The part which elementary schools play in the dissemination of infectious disease, not only among the children attending the schools but in the community generally, has emphasized the need for their regulation in connection with public health administration. Again, the opportunity which the aggregation of children in schools affords for their periodic examination, and for the application of remedial measures when these are required, has been recognized to be so intimately related to the public health as to necessitate the control of the administration being vested in the medical officer of health. It is true that this was not accomplished without effort and in some

instances not without conflict, for claims of special knowledge of "school hygiene" were put forward as being of paramount necessity for administration, some of which were better fitted to influence the lay than the professional mind.

Still later the National Insurance Act has provided a system for the treatment of disease among the working people of this country, which, when extended to dependents, will come into close relationship with that which now provides medical attendance upon children attending elementary schools. Here will arise need for nice discrimination between the maladies of the child of school age which should be undertaken by the Education Authority and those which should fall for treatment to the panel practitioner.

The State, however, has public health duties beyond those we have mentioned. The excellent work which is done by the Factory Department of the Home Office by a separate staff engaged in safeguarding employed persons from industrial disease, is of course essentially of a public health character, and the same may be said of the duty of regulation of midwives which is undertaken by the county councils, the Central Midwives' Board and the Privy Council. We are not aware that the public suffers by this distribution of allied duties among so many authorities, but the natural tendency is to group similar functions and to place them under the same Government department and under the same local authority. With respect to a number of those we have mentioned, there would be no difficulty in determining to which branch of national administration they may be said to properly belong, but necessarily, as a wide view is taken of the causes of mortality, much of that which is preventable may be said to be due to ignorance. This is especially true in respect of infant mortality, and medical officers of health will be at one with Sir George Newman in his conclusion that "The principal operating influence is the ignorance of the mother,

and the remedy is the education of the mother." The grant made by the Board of Education to schools for mothers must be thought of as relating to education, and Sir George Newman states that "the central activity of the school is usually the infant consultations," home-visiting being "the necessary corollary of consultations." So, again, the Local Government Board distributes grants in aid for "consultation centres" to which expectant mothers and mothers with infants and little children may be referred for advice and treatment. Home-visiting is encouraged, and for this purpose the appointment of health visitors is recommended.

There is, therefore, close approach between the action of the two Government departments. The advice given by Sir George Newman and Dr. Newsholme is practically the same, the methods of attaining the desired result are very similar, and the really material difference is in the administration. We can hardly doubt that when the Government has the opportunity there will be consideration of the duties undertaken by Government departments and local authorities.

Under existing circumstances the State is able from time to time to secure for its services men of exceptional mental calibre. It is only necessary to mention the names of Simon, Buchanan, and Power in this connection. With increasing recognition of the public health aspects of work now undertaken by various public departments, the question may well be considered whether a Consultative Committee, on which various branches of knowledge and experience are represented, might not meet the requirements of the present time. The Government has no principal medical officer, although some of its departments have such an officer at the head of their medical services. In view of the wide range of medical science and the numerous problems upon which medical advice is or should be required, this position could hardly be held by one man, and this is not matter for surprise when it is recollected that the advice might have to relate to administration needed to deal with disease in all parts of the world. Such a committee would be able to serve a useful purpose in co-ordinating the work of different departments. It certainly should be consulted before new branches of work are undertaken which involve large national expenditure, especially because it becomes impossible ever to abolish any large administration after it has once been established, however fruitless it may eventually be found to be. This consideration assumes especially large proportions at the present time when taxation for military and naval purposes must necessarily be severely felt.

IS ANY PART OF THE PRESENT DECLINE IN THE BIRTH-RATE CYCLICAL?

By A. K. CHALMERS, M.D., D.P.H.,
Medical Officer of Health, Glasgow.

THE query which is used as the title of this paper is suggested by the editor's introductory remarks in the January number of PUBLIC HEALTH.

The answer must obviously be mainly conjectural, although even a conjecture must proceed on some assumed or actual basis. Analogy may help, and there are illustrations in plentiful abundance. Many of the common infectious diseases are cyclical in their incidence and there is reasonable ground for thinking that this affects age, season and fatality alike. The periodic recurrence of measles can only be explained by assuming regular waves of activity affecting the organism which causes the disease, while accidental conditions such as age, housing, feeding, etc., and "weather" contribute to determining whether we shall have an increased mortality from the disease proportionate to the increase in its prevalence. Changes in virulence no doubt also play a part. The increased prevalence of diphtheria in many districts in Scotland during quite recent years suggests increase in the germinal activity of the organism, that is, an increased power to multiply and consequently to infect a larger number of the population than formerly, but that it lacks the concomitant of virulence is suggested by the relatively smaller increase in the fatality which it is causing. The greater incidence of attack at ages 5-15 since 1906 is one of its most striking features.*

Plague again during the last twenty years has displayed germinal activity and consequent prevalence, which was quite unknown during the interval between the Moscow outbreak in 1770 and the reappearance of the disease in 1894 in Hong Kong. These analogies, however, are based on the records of occurrences, which are becoming increasingly accurate as their importance becomes recognised.

The present decline of the birth-rate is in a different position. It seems to stand alone—completely detached from any similar movement in the past. Its occurrence over a wide field would appear to be of quite recent date, nowhere I think, in this country at least,

* See Paper "On the Increase of Diphtheria in Scotland in Recent Years," read at Congress of the Royal Institute of Public Health, Edinburgh, July, 1914.

earlier in its beginning than the middle "seventies" of last century, selective apparently in the sense that it is more marked in some groups of population than in others, and associated with such apparent relaxation in moral and religious standards that every epithet suggestive of racial decadence seemed not only descriptive but deserved. Much valuable work has of late been done to demonstrate the association between this decline and the development of certain social factors, which may be economic in their origin although purely deliberative in their application. Into the middle of this assumption the editor projects a timely query, whether birth and death alike are to be regarded as having normal rates from which any departure is to be ascribed wholly to administrative or deliberate and co-ordinated action. Stated in this way the problem becomes clearer, and analogies from plant as well as animal life may come within the field of discussion.

For the moment, however, I am rather concerned to suggest that local sources of information may here and there be available extending further back than national records, but capable of being pieced together in such a manner as to be turned to account in the enquiry. Mainly I think they will consist of parish or kirk records of marriages and baptisms with an occasional statement of the population. Some information of this sort is available for Glasgow, which affords glimpses, at long intervals, of the probable birth-rate and fertility of marriage, and it is because they suggest marked fluctuation that they may prove of interest.

It is not of course suggested that cyclical variation alone may explain the very rapid decline which we are witnessing, but it is at least conceivable that it may determine the direction of a movement which other and probably more readily demonstrable causes may accentuate or retard.

In any case the object of the paper is to suggest an appeal to local records in the hope that they may contain evidence bearing on the question.

It may render the bearing of the earlier records of Glasgow somewhat clearer if I deal first of all with our recent experience.

For a considerable number of years after the introduction of registration the crude birth-rate of Glasgow was fairly well maintained at or over 40 per 1,000.

Until 1879 indeed it had only fallen below 40 in the years 1869, 1871 and 1873.

In the first year of registration (1855) the rate was only 37, but that is probably to be explained by failure to observe the newly-imposed obligation.

Since 1879 the fall has been progressive, and during the last five years (1909-13) the highest annual rate was 29.6 in 1909 and the lowest 27.7 in 1911. These are calculated on the total births occurring and registered irrespective of the usual place of domicile of the mother.

A period of industrial depression in the late seventies marked by the failure of the City of Glasgow Bank coincided with the beginning of the fall, but there was no corresponding and sustained recovery when industrial conditions improved.

The decline from the sixties decade may be represented by the difference between a rate of 41 per 1,000 and one of 28, or somewhere about 32 per cent.

This statement of it, however, fails to allow for the varying population of women at child-bearing ages, and when the births are applied to this section of the population, the actual reduction of the birth-rate in the last 40 years amounts to 57 per cent.

Glasgow—Mean Annual Birth-rate.

	Calculated as a Proportion per 1,000 on Total Population at All Ages.		Calculated as a Proportion per 1,000 on the Number of Women aged 15-45 years.	
	Rate per 1,000.	Compared with Rate in 1870-72 taken as 100.	Rate per 1,000.	Compared with Rate in 1870-72 taken as 100.
1870-72	40.9	100	173.5	100
1880-82	35.9	88	150.7	86
1890-92	35.2	86	125.6	72
1900-02	32.1	79	124.2	72
1910-12	28.0	68	109.2	63

Decline in birth-rate associated with fall in marriage-rate and in proportion of marriages contracted at ages under 21:—

Associated with this decrease in the birth-rate there has been a decrease in the marriage-rate, and a reduction in the proportion of marriages contracted at early ages.

The contrast between the rates calculated on the total population and on unmarried females is shown in the next table, from which it would appear that the actual decline in the rate of marriage of females at marriageable ages during the last 40 years has been 12 per

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cent. in place of 6, which is the rate of decrease when calculated on the total population.

Glasgow—Mean Annual Marriage-rates.

	Calculated on Total Population at All Ages.		Calculated on the Un-married Females & Widows, aged 15 years and upwards.	
	Rate per 1,000.	Compared with Rate in 1870-72 taken as 100.	Rate per 1,000.	Compared with Rate in 1870-72 taken as 100.
1870-72	10.0	100	54.7	100
1880-82	8.8	88	50.7	93
1890-92	9.5	95	46.5	85
1900-02	9.6	96	50.9	93
1910-12	9.4	94	48.4	88

Along with this another factor in the reduction of fertility is supplied by the decrease in the proportion of early marriages, which, however, for other reasons is probably desirable.

In Scotland as a whole the proportion of women contracting marriage at ages under 20 and under 25 to the total number marrying fell almost 23 per cent. and 8 per cent. respectively between 1871-80 and 1901-10, and in Glasgow the proportion of males contracting marriage under 20 years of age fell 27 per cent., and of females 31 per cent. in the thirty years 1879-81 and 1908-10*.

Having in view the high potential fertility of these ages and the marked decrease which occurs with each quinquennial advance † this reduction in the proportion of persons marrying under 21 and under 25 must largely reinforce the tendency towards a reduction in the number of births, which the falling marriage-rate introduces.

THE FERTILITY OF MARRIAGE.

We may exclude the effect of a reduced rate of marriage by considering the number of births in relation to the actual number of marriages which take place. In the following table this has been done for the past 50 years, and in that interval the number of births per 100 marriages would appear to have fallen from 405 to 336, or almost 15 per cent. The ratio in 1901-10 was, however, 21 per cent. below that of 1871-80.

* To repeat this more shortly, it may be said that in 40 years the proportion of women in Scotland marrying under 20 years of age fell 23 per cent., while in Glasgow over a shorter period (30 years) the reduction has been equal to 31 per cent. It may be suggested also that the "area of selection" has been reduced, for at the Census of 1861 in Glasgow there were 111 women to every 100 males at ages 15-20, but in 1911 only 104. At ages 25 these proportions were 121 and 111.

† See Fecundity, Fertility, &c., J. Matthews Duncan, 2nd Edition, 1871, pp. 19, 218, 246.

Year.	Average Annual Number.		Births per 100 Marriages.
	Births.	Marriages.	
1861-70	178,383	39,776	405
1871-80	200,866	47,407	424
1881-90	196,451	48,833	402
1891-1900	232,399	65,231	356
1901-10	238,936	71,117	336

To some extent this may express the result of postponement of the age at marriage, and it gains some support from the contrasts presented in comparing the children born per 1,000 married women at ages 15-45 in several towns. The possible error in the following comparison lies in crediting all the births to the married women between these ages, and in assuming that the married women in different populations have a corresponding age distribution.

In any case when the number of births is compared with the number of married women, one finds that in Glasgow in 1890-2 for every 1,000 married women at the above ages 308 children were born against 232 in 1910-12; that in Edinburgh the corresponding figures were 262 and 188; and in Dundee 276 and 222.

In other words, the fertility rate in the 20 years fell 24 per cent. in Glasgow, 28 per cent. in Edinburgh, but only 20 per cent. in Dundee.

It is possible that the lower rate of decrease in Dundee may have part explanation in a larger proportion of married females at the earlier age periods.

Birth-rate and Fertility in the Seventeenth and Eighteenth Centuries:—

The fertility of marriage and the birth-rate in Glasgow during the years 1860-90, are of interest in relation to some similar figures which exist for the first three decades of the eighteenth century and for two years of the seventeenth.

I have taken the information from a volume of "Statistical Tables Relative to the City of Glasgow," published in 1828 by James Cleland, who was superintendent of public works in Glasgow at that time.

It would appear that in 1609 a register of baptisms in the city began to be kept by order of the Session. The number thereof in the first year quoted (1611) is given as 268: In the preceding year (1610) a census of the population had been taken under direction of Archbishop Spottiswood (on the resumption of Episcopacy), and was found to number 7,644.

This suggests that the crude birth-rate of the population at that time was about 35 per 1,000, and this ratio is also that of the year 1660, when the baptisms numbered 520 and the population 14,678. This was at the Restoration of Charles II.

Similar birth-rates were recorded during the latter half of the eighties decade of the nineteenth century, and we have seen that the number of births per 100 marriages during this decade was 402, having been 424 during the seventies.

I have not been able to discover any corresponding figures for the seventeenth century other than those quoted, but during the first three decades of the eighteenth the information available suggests that the number of births per 100 marriages did not differ very materially from those recorded in more recent years; that is, they numbered from 414 to 420.

Year.	Average Annual Number.		Births per 100 Marriages.
	Births.	Marriages.	
1701-10	500	120	417
1711-20	576	137	420
1721-30	609	147	414

It is, unfortunately, impossible to follow these records into the following decades of the eighteenth century with any feeling that they are reliable, for the separation from the Established Church, known as the Secession Movement, affected a considerable number of the inhabitants, who declined registering the names of their children in the parish registers.

In Cleland's volume, however, there occurs this suggestive observation: "As a remarkable proof of the inattention of parents (to the propriety of registering the names of their children) there were in the Barony Parish of Glasgow in 1822 proclamations of 575 marriages, but only 518 registrations of baptisms, whereas the number of children effeiring to these marriages would amount to about 2,000." (p. 27).

The interest of the suggestion here, I think, is that considerably under 400 (about 348) children per 100 marriages was the expectation in the third decade of last century against an actual ratio of 424 in the seventies decade, 306 in the nineties, and 336 in 1901-10.

In any case the number of children expected to result from a given number of marriages in 1822 was considerably below the recorded number a century earlier, and also lower than what occurred 50 years afterwards.

If the figures given are reasonably accurate, as I believe them to be, they suggest an ebb and flow of fertility over long periods associated with and aided, it may be, by economic conditions which lower the rate and postpone the age of marriages, but are primarily dependent on what may be regarded as fluctuations in germinal activity.

MEDICAL SUPERVISION OF SCHOOL-CHILDREN.

PROFESSOR DOMENICO DELLA ROVERE discusses the question of medical supervision of children at their entry into school and during the course of their school-career. It would appear that attendance at school is obligatory in Italy, and that it commences at six years of age. Dr. Rovere is justly indignant at the rigidity with which this regulation is enforced. The child is haled to school as soon as it has attained its sixth birthday, no matter whether or not it has attained a proper degree of development. The writer contrasts it to its disadvantage with the other system of compulsion in force in Italy, viz., conscription. In the latter, although it is compulsory for the man to present himself, yet he is passed into the army only if he is proved by medical examination to be fit for it. Dr. Rovere would have the same system in schools. The child on admission should be examined medically, and his admission to school should be postponed for one or even two years if he is not sufficiently developed in physique. In this connection the interesting fact is noted that in Berlin in 1912-13, 3,221 out of 36,104 entrants were found to be unready for school-life, on account of debility, anæmia, rickets, etc., and were hence excluded for a period.

Dr. Rovere points out the further and wider advantages which would follow medical inspection—advantages which are familiar in this country. *Giornale della Reale Società Italiana d'Igiene*. No. 6. June, 1914.

MILITARY & NAVAL APPOINTMENTS.

DR. THOS. E. FRANCIS, medical officer of health and school medical officer of the Borough of Llanelli, has been appointed temporary surgeon in the Royal Navy.

DR. G. C. MORT, assistant medical officer of health, school medical officer and tuberculosis officer of Burton-on-Trent, has been called up for service in the Navy.

DR. NOEL WADE, medical officer of health of St. Mellons R.D. and Risca U.D., has been called up to serve as temporary surgeon at Plymouth Hospital.

DR. J. HUTCHINSON WOOD, medical officer of health of Biggleswade U. and R.D.'s, has accepted a commission in the 2nd London Sanitary Corps, affiliated to the R.A.M.C.

DR. FRED E. WYNN, medical officer of health, chief school medical officer and chief tuberculosis officer of Wigan, now holds a commission in the R.A.M.C.

CRIMINAL ABORTION AND ABORTIFACIENTS.*

By WILLIAM F. J. WHITLEY, M.B., B.Ch., Edin.;
D.P.H., Oxon,
Deputy Medical Officer of Health and Tuberculosis Officer,
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THE study of infant mortality presents many serious and conflicting problems. The factors which govern it are numerous and varied. Contiguous towns engaged in the same industry present marked variations, such variations being dependent upon purely local influences.

Speaking generally, the counties which enjoy undesirable records for high infant death-rates are the following:—Lancashire, the West Riding of Yorkshire, Northumberland, Durham, Northampton, and Glamorgan. Careful examination of this list suggests three well marked economic and social characteristics:—

1. Coal mining plus female labour in the cotton mills of Lancashire.
2. Coal mining plus female labour in the woollen mills of the West Riding of Yorkshire.
3. Coal mining plus some unknown factor or factors in the remaining counties.

It may be that this unknown factor is common to all.

Consistent study of Table 4 of the Local Government Board returns on infant mortality reveals the fact that in those districts where married women are not industrially employed, equally with those parts of the country where female labour is the rule, there is a constant wastage of early post-natal life, due to prematurity, atrophy, debility, marasmus, and congenital defects. Occurring, as this undoubtedly does, in both industrial and non-industrial areas alike, it appears to suggest a common ante-natal origin. It must not be inferred from this statement that I attribute the whole of the deaths from the "group of five diseases" in industrial districts to this unknown cause. Such a view cannot be supported; innumerable factors come into play, such as environment, sanitation, the number of generations of working mothers, etc. The overplus of Lancashire's rate probably represents the price paid for the cotton industry, but in such counties as Durham, Northumberland, and Glamorgan, where there is very little female labour and a very high infant death-rate, with social conditions similar to those existing in Lancashire, it is evident that here the unknown agencies are

at work. These may be common to Lancashire, though masked by the pernicious influence of the cotton industry. What these factors are is a matter of speculation. They can only be arrived at by the process of exclusion, hence an inquiry into the subject of criminal abortion and the methods employed to procure it may be useful in assisting to clear the issues, either one way or the other. Such an enquiry, and any facts elicited from it, should commend itself to our consideration with special significance at this period of grave national crisis, when the flower of our manhood is being rapidly depleted and deteriorated by the vicissitudes and hardships of war.

For practical purposes criminal abortion may be divided into three groups:—

1. Those produced or attempted by means of violent purgation.
2. Those produced or attempted by the ingestion of drugs having a real or supposed poisonous action upon the foetus itself or uterine muscle.
3. Those produced or attempted by mechanical interference.

Co-incidentally, also, the order of this classification may be regarded as an index of the degree of criminality involved. It will be noticed that emphasis is laid upon attempted abortion. Neglecting for the moment the moral aspect of the question, the abortion which is attempted but does not prove successful is perhaps more serious and far-reaching in its consequences than the one which accomplishes its object.

In the one case life is utterly destroyed, in the other it is maimed and disfigured at its very inception, whilst the infant when born is frequently puny, undeveloped, and devoid of resistive power. It frequently perishes in the first few weeks of life from one of the "group of five diseases." If it should survive it is but to establish a pathological existence, and perhaps to perpetuate a race of degenerates. It will be convenient to consider these types in the order of the above classification.

I.—ABORTIONS PRODUCED OR ATTEMPTED BY MEANS OF VIOLENT PURGATION.

In a recent conversation with a gynaecologist of some repute, the opinion was expressed by him "that cathartics were useless for the purpose of procuring abortion." As students of midwifery we were taught that certain drugs enjoyed the reputation of abortifacients, but that for them to be effective the dose ingested

would be sufficient to endanger the maternal life in addition to that of the foetus, as what would endanger one life would be very likely to endanger the other. This teaching is supported by most of the text-books upon pharmacology and medical jurisprudence. Such statements remain true concerning those drugs which have a specific toxic action; unfortunately, however, they have come to be applied with equal force to cathartic substances in general. With much deference, I submit that the opinion expressed by my gynaecological friend is somewhat misleading. Whilst it may be true that cathartics will not terminate an advanced pregnancy, it should be borne in mind that such substances are most frequently taken in the earlier months of gestation, and it is to be feared are often successful. There is very strong evidence that by far the commonest way of attempting abortion in this country is by repeated, regular, and systematic purgation. The knowledge is common to every woman; it appeals to her as a safe and easy method; it offers little chance of detection. There are few married women who have not practised it in some degree; there are many who apply it regularly at the approach of each menstrual term. It is safe to say that in every case of illegitimacy this method has been given a trial, and it is doubtless a most important factor in determining the very high rate of mortality obtaining among that class of infants. Though obstetricians may doubt the efficacy of such measures, it would seem reasonable to suppose that abortion attempted by such means may result within the earlier months of pregnancy from any or all of the three following causes:—

1. Acute or chronic uterine, or pelvic congestion, induced by the drug itself, or by the frequent and spasmodic peristaltic movements of the intestine.
2. Extreme physical exhaustion.
3. Actual muscular contraction of the uterus, set up and stimulated by the repeated dynamic movements of that organ, in association with the rectum, more especially if this treatment is supported (as it very often is) by hot vaginal injections, and unusual violent exercise.

It is not difficult to imagine that an ovum, newly fertilised, and but recently deposited within the uterus, may meet with disaster from such treatment. Granted that these hypotheses are exorbitant, there remains the one question which is of importance to us, "Can a woman debilitated by such excesses bear a healthy infant?"

With regard to the drugs in common use for this purpose, very unfortunately, even the simplest household remedies are not exempt; but, from inquiries made, I find those drugs which possess a griping action most popular. The following are among the principal substances employed:—

All preparations of colocynth, especially the five-grain pill and the powder. All preparations of aloes. Combinations of both these drugs. Pills made with colocynth, aloes, and diachylon by illiterate women, sold or given away with an air of mystery or superior wisdom. Pills containing aloes and rhubarb or jalap and rhubarb, similarly made and distributed. Seven-grain "Blue Pills." A double-strength Mist Ferri Co. with Decoctum Aloes Co. A mixture containing Decoctum Aloes Co. and Extr. Ergot Liq. Epsom Salts. Whole boxes of Beecham's Pills. Hiera Picra, popularly known as "Hikey Pikey," a compound of aloes and canella.

If the demand for such drugs as the above be any index of the prevalence of this custom, then its distribution may be said to be practically universal in this country. The practice is not confined to the working classes; indeed, there is reason to suppose that it is equally common amongst women of some education. There is no doubt that it is pursued with a recklessness and energy which too frequently ensures its success. To this fact almost every general practitioner can testify. The indifferent attitude with which such procedures are looked upon by many women is very disturbing. I am convinced that this aspect of criminal abortion is of much graver import to the welfare of this nation than is commonly realised. Its very insidiousness and universality is disarming. It is most difficult to speak positively upon such a question, but facts seem to justify the following conclusions:—

1. That it is possible to procure abortion by such means.
2. Where the abortion does not succeed the child frequently does not live long.
3. In the event of survival such children exhibit a tendency to develop nervous diseases. Such conclusions are not merely the outcome of empirical speculation.

II.—ABORTIONS PRODUCED OR ATTEMPTED BY DRUGS HAVING A REAL OR SUPPOSED POISONOUS ACTION UPON THE FOETUS ITSELF OR THE UTERINE MUSCLE.

There can be no difference of opinion concerning the efficacy of the chief substances employed in this group, and those who resort

* Read at a Meeting of the Society of Medical Officers of Health on January 8th, 1915.

to them are either grossly ignorant or wholly depraved. It should be stated that there is often a wide psychological difference between the woman who employs purgation as her agent and she who consumes such a drug as diachylon. The former, by accentuating a natural function, hopes to produce what is regarded as a simple miscarriage, which she looks upon as an indirect result of her action. The latter, unless quite illiterate, realises very fully that hers is a deliberate attack upon the unborn child. This is not a distinction without a difference. Enquiries show that those who resort to purgation frequently do not pursue it beyond the third month if unsuccessful. Further, there is evidence that professional abortion-mongers of this school will not supply their wares to women advanced in pregnancy. I have direct proof of this. Such cannot be said of the other class. Amongst the substances in common use in this group are the following:—

Diachylon. Quinine sulphate. Permanganate of potassium. Oleum pulegii or pennyroyal. Liquid extract of ergot. Oleum sabinae. Tincture of gossypium. Gunpowder. Oleum chamomilis. Infusion of southernwood. Preparations of rue. Ergo-Apiol. Iron filings. Iron shavings. Large quantities of sulphate of iron crystals. Human urine.

Time will not permit me to discuss the whole of these individually. I will deal with those upon which, in my opinion, it is necessary for us to concentrate our attention with a view to subsequent action.

Diachylon.—To those interested in the history of this drug as an abortifacient let me refer them to a very interesting paper on the subject by Dr. Arthur J. Hall, of Sheffield, which was read at the International Congress of Medicine in 1913.

With regard to the exact extent with which diachylon is employed for abortifacient purposes it is most difficult to obtain absolute information. I have twice revised my own opinions within two years, and at the time of writing have a somewhat open mind upon the question.

Twenty-one years ago the area of distribution of recorded cases of diachylon poisoning was very circumscribed (*vide* Dr. Hall's map), and restricted almost entirely to the Midland Counties; now the knowledge is very widespread indeed. In my opinion, however, acute plumbism is no measure of the use of diachylon as an abortifacient. The demand for the drug

through the usual channels is still very frequent, increasingly so in many places, but on the whole seems to show a general tendency to decline. This is most probably due to the very praiseworthy refusal of many chemists to supply it under any circumstances in the unspread state. It must not be inferred from this statement that the use of emplastrum plumbi as an abortifacient has actually declined; that is very much open to question. There is ample evidence to show that some chemists, profiting by the chivalry of their brethren, still supply it—a few seem to do so in ignorance—others again fortify themselves by demanding a signature for its sale in the poison book. Diachylon can also be purchased with ease through the medium of the herbalist, and even the small grocer. The latter, however, may be entirely ignorant of the purpose for which it is required, as in some districts there seems to be a legitimate use for the purpose of delactation. Within the past week a pennyworth of diachylon was purchased for me at a herbalist's shop in a certain Lancashire town. No questions were asked, whilst an ounce and a half of the mass was supplied and enclosed in a printed wrapper. The bag with its enclosure is upon the table for your inspection. I have further information that this substance can be purchased with similar ease in various parts of the country from similar sources.

There is a curious tendency for the custom to suddenly appear in epidemic form in hitherto unsuspected places. Such epidemics last for a time, then die down. Their appearance is probably due to the removal into the district of some disgraced midwife, who makes pills and sells them, or to some woman who has personal experience of "the virtues" of diachylon; the collapse of the epidemic being caused by the refusal of the local chemists to sell after conference. It is unfortunate that many wholesale druggists have catered for this illicit trade by making up half-ounce sticks to sell at the retail price of one penny. Recent enquiries show that some of the firms who formerly encouraged this line of business have now discontinued it after pressure, whilst others still cultivate it. In order to prevent repetition I will reserve further remarks upon this drug, and pass on to the consideration of quinine, ergo-apiol, and permanganate of potassium.

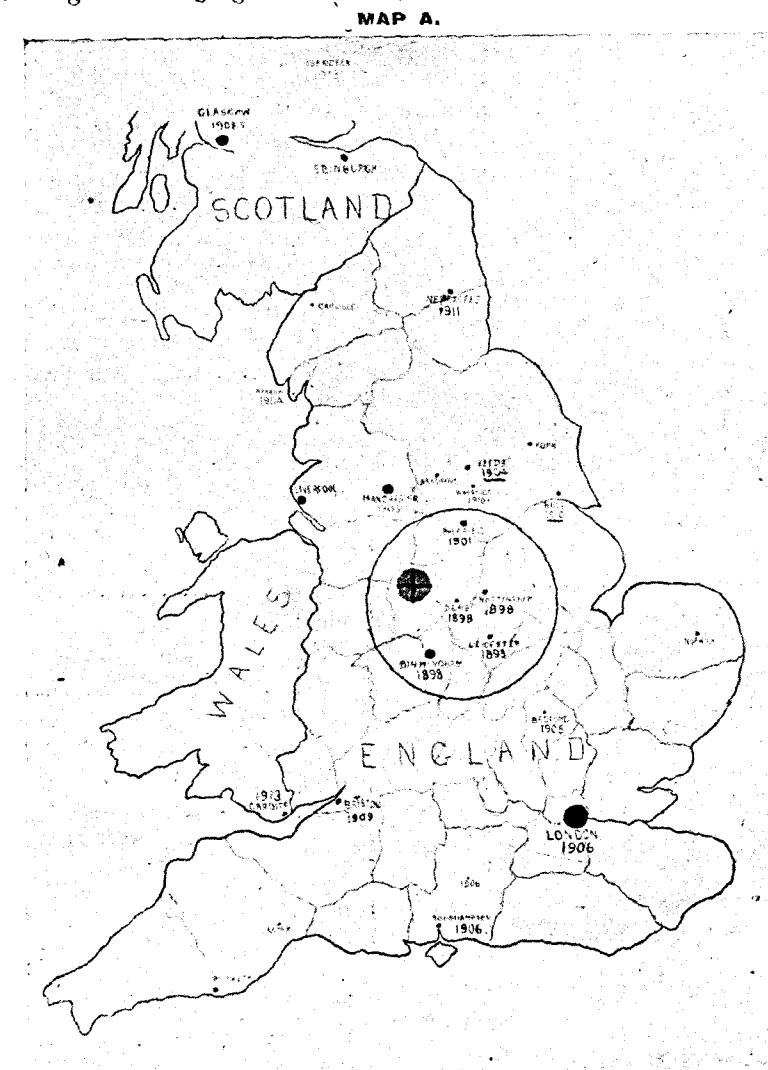
These drugs are as yet in their infancy for the purposes of criminal abortion. Their presence in such a list demonstrates the unfortunate application to an evil purpose of a

trained mind. The ease with which they can be obtained in tablet and capsule form, the variety of legitimate therapeutic uses to which each drug may be put, make it exceedingly difficult to estimate and control their use for improper purposes. The importance of these substances with regard to this subject should not be overlooked. I have direct evidence of three cases of grave and almost fatal hæmorrhage, following the ingestion of 30-grain doses

seems to be more common in the south of England, whilst permanganate of potassium is common in both north and south.

The use of gunpowder is exceedingly popular in the north of England. Teaspoonful doses are taken three times in twenty-four hours. Grave cases of collapse have been reported to me as following its use.

Mention should also be made of a custom somewhat prevalent in the West Riding of



Map showing centres at which cases of Diachylon Poisoning have been observed. These are indicated by the approximate date at which the earliest cases occurred. In places without dates there is no record of cases. The large circle indicates the area where the practice began and has been most common. The circle within indicates "The Potteries" district. Reproduced by kind permission of Dr. Arthur J. Hall, Sheffield.

of quinine, within the past six months. This drug is commonly consumed along with gin. I am informed that there is an increasing demand amongst the upper classes for the proprietary preparation ergo-apiol. This being a stamped medicine is freely bought, as also is permanganate of potassium, in tablet form. The use of quinine and ergo-apiol

Yorkshire. Amongst the uneducated classes there is a very old and deep-rooted belief that if a pregnant woman continue to drink her own urine she will surely abort. To what extent the custom is practised information cannot be obtained. The knowledge is exceedingly common and of some antiquity. I am able to give you the personal assurance that I

have seen a pregnant midwife, herself in actual attendance upon a woman, with a cup in her hand consuming her own urine. At such a period there would seem grave danger of producing an artificial uræmia, with all the concomitant evils of that condition.

III.—ABORTION PRODUCED OR ATTEMPTED BY MECHANICAL INTERFERENCE.

The degree of criminality involved in this method is supreme, since at least two—more often three persons, with accomplices and assistants—are implicated. Ignorance cannot be pleaded as an extenuating factor. There is little doubt but that it is on the increase, its distribution being confined to large centres of population. Speaking quite recently to a northern surgeon, I was informed that the women of his city did not now trouble about diachylon, they resorted to the homely knitting-needle, preferably the wooden kind, whilst occasionally a hat-pin is used. In some Lancashire towns I am informed that quite a number of women do these operations, and that their clients are by no means restricted to one class, the instrument employed being a wax taper. It is presumed that the taper being of such consistence, that should it not find its way directly into the cervical canal, any force applied will cause it to bend upon itself rather than penetrate the uterine walls, and run the risk of entering the peritoneal cavity. There would thus be little evidence of external interference. During the recent prosecution of such a woman a large quantity of zinc sulphate was found amongst her stock-in-trade. This, I am informed by the police and chemists, is used for the purpose of hot vaginal injections. There is thus direct evidence that many of these abortionists are antiseptic in their methods, and possibly by such measures succeed in building up a large connection, leaving a minimum of incriminating evidence behind. One pauses to think what will happen should these people apply the principles of aseptic surgery with a knowledge of anatomy to their nefarious trade. This form of procuring abortion is not restricted to the north of England.

GENERAL OBSERVATIONS.

Though a knowledge of the substances used and the methods resorted to in procuring abortion is undoubtedly useful, it is of greater importance to realise how many and of what kind are the agencies which are actively at work, directly and indirectly, fostering the trade, and disseminating information of a most pernicious nature.

One of the worst offenders in this respect is the public press. It is not possible to pick up many newspapers nowadays which do not contain advertisements of so-called female remedies. Even those publications which are given over to religious purposes accept these thinly disguised effusions. I have been at some pains to procure samples of the wares advertised and to correspond with the *specialists* who purvey them. Time will not permit me to give more than a brief summary of their methods, which are characterised by exorbitant charges, a cunning system of blackmail, and suggestion by innuendo.

An enquiry frequently brings per return of post a bundle of literature such as displayed upon the table. Amongst this there is frequently inserted a printed form such as the following:—

To the Manageress,

Confidential. Kindly fill in this form, giving a clear account of your case, and the treatment will be prepared in exact accordance with the symptoms revealed by the answers given. It is not necessary you should reply to all of the questions, but it is important you omit none which are likely to assist me in forming an opinion of your complaint.

QUESTIONS.

Please be explicit.

1. Age?
2. Appearance—plump or thin?
3. Married, Single, Widowed?
4. Any children?
5. Your occupation?
6. Usually, regular to date?
7. Any pain in abdomen?
8. Appetite good?
9. Any morning sickness?
10. Is Menstruation usually easy, difficult, or painful?

Please write the number of your Postal Order in this space. No error can possibly arise when this rule is observed.

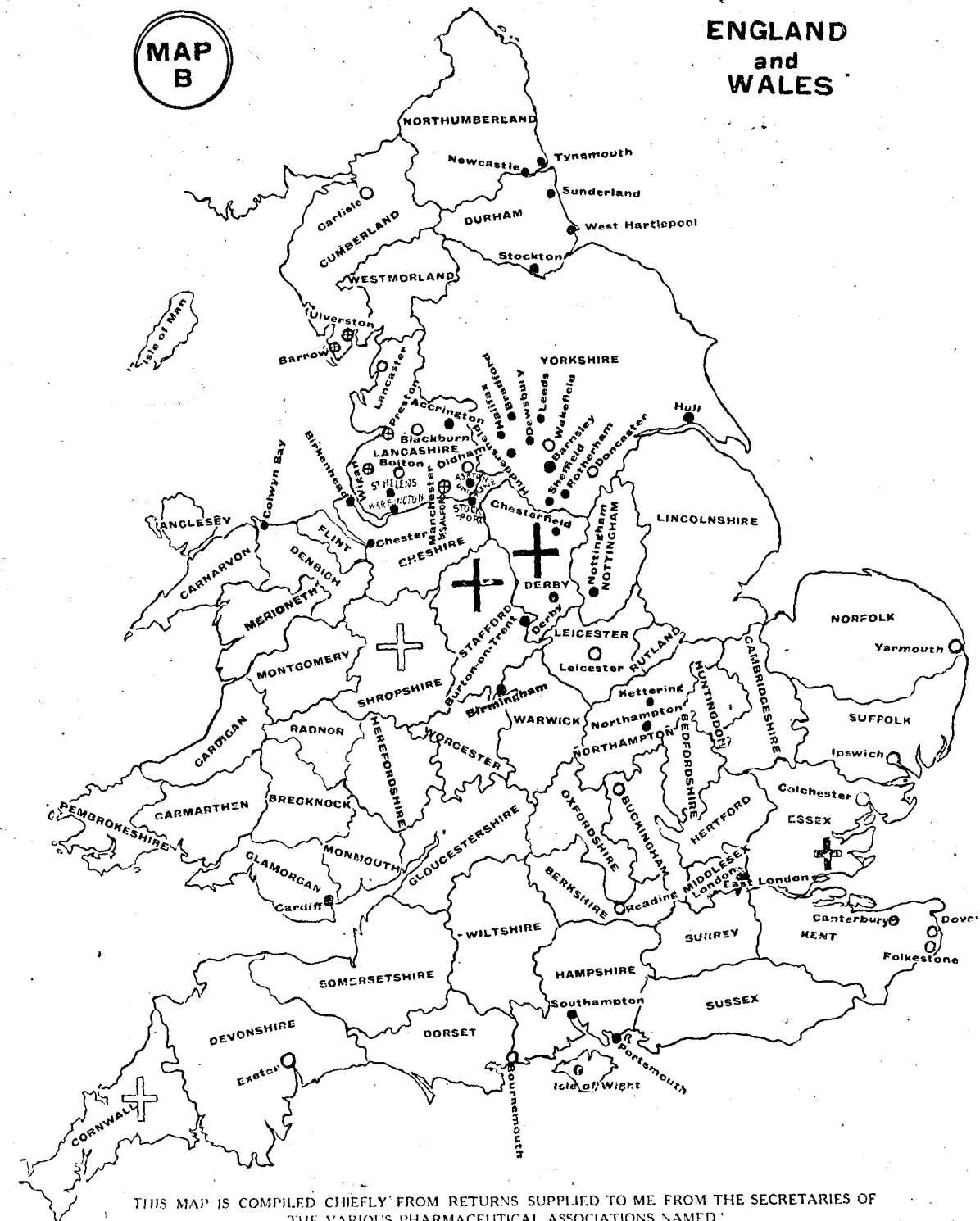
POSTAL ORDER No.

PLEASE Name (Mrs. or Miss).....
WRITE Address

PLAINLY.

Enclosed with this form was a covering letter extolling the virtues of a "remedy" for speedily removing female obstructions, suppressions, and irregularities (from whatever cause arising, and no matter how long standing)."

I invite you to consider how carefully this plausible statement is worked out. Such a document when signed would amount to a virtual confession of pregnancy from a woman who is seeking to free herself from its obligations. Further, the question as to occupation



● indicates towns where the demand for diachylon is frequent.

○ indicates towns where the demand for diachylon is occasional.

⊕ indicates towns where the demand for diachylon is frequent, but where the information has not been supplied to me through an official source.

++ Represents the district covered by a county area as distinct from a town.

would yield very valuable information as to how far the goose might be plucked. What an instrument for blackmail if placed in unscrupulous hands! Ostensibly these people profess to treat amenorrhœa. Is it not a significant fact that delicately-minded women should be expected to search the columns of trashy journalism in order to discover the means by which they can be relieved of functional derangement?

The following is a reply to a decoy letter which I sent out in the name of a female, implying that the periods had been missed for three months, and asking for advice:—

(Address and date.)

Mrs. ———,
Lancaster.
Z. E. Special Strong.
(In hand writing.)

Dear Madam,

I am in receipt of your letter to which I have given every attention, and which I will keep by me for future reference. I can send you the treatment that you require for your complaint and it will cost you 5/6 for one month's treatment, there are a very large number that have been sufferers like yourself that I have PERMANENTLY CURED and if you place your case into my hands I will give you every attention, and do all that you require, remember that the treatment is not one medicine for all complaints, BUT YOU WILL HAVE A SPECIAL TREATMENT FOR YOUR SPECIAL COMPLAINT. When sending for the treatment kindly answer the following questions (returning this letter to me along with Postal Order for above amount).

Age?

Weight?

Mrs. ———. SPECIAL.

The state of the bowels?

Do you drink much tea? Reference book ———

Have you palpitation of the heart?

Is your appetite good?

and anything else that you think I ought to know,

remember that whatever you write to me is STRICTLY CONFIDENTIAL, and that I treat all cases myself,

and my experience is great, having been over 40 years a practitioner, and I have now the LARGEST PRACTICE in the counties of ———, ———, or ———, all my remedies are prepared from NATURE'S REMEDIES, viz.:—HERBS, ROOTS, and BARKS. The medicine will be sent to you in a Plain Package, Carriage Paid by me, the same day that I receive your order and with it full directions for use.

Hoping to hear from you at your earliest, as the sooner you commence the treatment, the sooner you will be cured.

Kindly address all communications to me and oblige,
Yours faithfully,

(In hand writing:—)

This is a very special treatment for your case and the sooner you send the easier the cure.

Medical Herbalist,
(Address again follows here.)

Please state your address

.....
.....
State in which paper you saw my advertisement

The above is an exact copy. You will notice that the return of the incriminating document is asked for, and also further information of a compromising nature. This was underlined twice, and marked with an arrow. There is also a cunning request for the name and address. The letter was in imitation type-written print. Pills, mixtures, pessaries, and suppositories are among the goods retailed. In the many samples which I obtained I was unable to detect any trace of lead. For the purposes which they are sold I believe them in most cases to be quite worthless. To many of these gentry I addressed a letter couched in the following terms:—"Supposing that I am pregnant, will your medicine bring me right?" In no case was that letter answered. It is to be regretted that insidiously and very suggestively these people quote such names as Hale White, Dyce Duckworth, and Brown Sequard in support of medication by means of rectal and vaginal absorption. The inference is cunning and cruelly unscrupulous. They state themselves to be "registered lady specialists," and under penalties of £5,000, and brazenly claim that medical men send patients to them, and that their treatment is endorsed by the "Medical Society," whatever that means. The only recognition which has been vouchsafed to them, so far as I can discover, is the somewhat undesirable notoriety gained by figuring very largely in the pages of "More Secret Remedies." Still, there is every reason to believe that genuine abortifacients are supplied through the medium of the post.

It may be said that these people do no harm. This must be strenuously denied. By their nauseating literature and spurious philosophy they break down those healthy conventions which preserve self-respect, and thus make it easier to travel upon a very uncertain path.

One of their side-lines is the sale of Malthusian appliances, which are offered in illustrated price-lists with a vulgar and obscene candour. The happy parent who advertises the birth of a son or daughter frequently receives a sheaf of this literature as a reward for his pains.

Another favourite side-line is the sale of aphrodisiacs for the stimulation of worn-out libertines. These preparations, like the pills and mixtures, are graduated in strength and price. Some of them are reputed to act immediately. After the suggestion contained there, can it be said that these people do no

harm? Such things may be comparatively innocuous in Leicester Square, but when they reach the provinces the story is quite a different one. It is, as a virulent disease upon virgin soil, demoralising and devastating in the extreme. We are not assembled here as censors of morality, but it must be acknowledged that the more healthy and vigorous is the moral tone of our manhood the less need will there be for us to discuss such subjects as these.

The investigation of this subject, however unpleasant and revolting at times, has not been altogether devoid of humour. The following advertisement appeared in one of the so-called comic papers:—"WHAT GIRLS SHOULD BE TOLD. Special private book, 92 pages, entitled YOUTH AND SEX. Postal order 1/2. Also book FOR THOSE ABOUT TO MARRY, 159 pages, containing many French secret recipes, translated into English. (Sent in plain wrapper). Postal order 1/1½. From ———, ———, etc."

The wording of the advertisement is exceedingly clever. There is an air of seductive mystery about it which is intended to appeal to the lower instincts, and at the same time convey the impression that one is about to enter the portals of real knowledge through the Eastern gateway. The delicate Oriental flavour imparted by the signature shows the writer to be possessed of rare acumen and a deep knowledge of the frailties of human nature.

Knowing the district from which the advertisement issued to be one of doubtful reputation, a postal order for the amount was dispatched. Per return of post I received a copy of a very ancient volume entitled "How to Cook for Myself and Family," which contains, among other information, a curious recipe for the cure of hydrophobia, the ingredients of which are rue leaves, six ounces of garlic, Venice treacle, and scrapings of pewter (of each four ounces), boiled in two pints of strong ale over a slow fire until one pint is consumed. Nine spoonfuls to be given each morning warm for seven days, fasting. History states that this recipe was taken from Calthrop Church, Lincolnshire. Many of the inhabitants being bitten with a mad dog, all that took this medicine did well, while the rest died mad.

We now approach the most difficult part of our subject, viz., the part played by the ordinary pharmacist in the dissemination of abortifacient drugs. At this stage I should like to make acknowledgment of the valuable

help and many real kindnesses extended to me by chemists in all parts of the kingdom. Although I believe the great majority of them discourage the sale of abortifacients as such, yet I cannot blind myself to the fact that much of this evil is due to counter-prescribing. There are few chemists who do not consider themselves fit and proper persons to treat amenorrhœa. In the north of England many pharmacists enjoy reputations for treatment superior to those of the local practitioner, even amongst educated people. It is not an uncommon experience for me to have the opinion of a local chemist quoted against my diagnosis. I have even had my treatment reversed. It is not just to our profession that these things should be; it is not just to the women themselves. Suspension of the menstrual function may be due to many grave pathological disorders. Chemists inform me that they supply such drugs as colocynth, etc., and, though they may be suspicious of the purpose for which they are required, they consider it a matter of some delicacy to question the purchaser. This same attitude is adopted to those women who come to them for the treatment of amenorrhœa. I submit that it is the first duty of any man who holds himself out to treat this condition to make sure that it is not physiological, and due to pregnancy. No pretence of delicacy can absolve him from this. It is not to be expected that it can be accomplished in a chemist's store, nevertheless the fact remains. A pharmacist in a very large way of business recently informed me that he saw no harm in prescribing a simple mixture for a woman who had only passed one period, especially in a case of extreme poverty. On humanitarian grounds he appealed to me if I would not do the same. Such an attitude is dangerous in the extreme, and is but temporising with uncleanness. Further, how is the chemist to satisfy himself as to the correctness or otherwise of the woman's statement? Again, the psychological element comes into play; chemists who will supply a woman with a mixture "to bring on the courses" would refuse point blank to give a woman drugs for the procuring of abortion. Further, it is to be regretted that there are some men who make lucrative profits from the sale of mixtures to women whose physical appearance is an indication of the purpose for which they are required.

Another class of irregular practitioner responsible for much of this trade is the herbalist, sometimes described as such, at other times

as "Professor" or "Madame." I am able to demonstrate that this is often the chief feature of their business. The usual custom is to pay a specific sum for a week's treatment. As I have already stated, diachylon can be freely bought at these shops. Frequently these practitioners are women, who visit several towns on successive days of the week, thus enlarging the sphere of their evil influence. A favourite haunt of such persons is the seaside health resort. In the summer season a very lucrative trade is done in pills and mixtures; during the winter I strongly suspect that many of them resort to the instrumental methods. It is surprising how many women are to be found at the smaller seaside resorts at this season of the year who are suffering from suspicious uterine disease.

A further class of abortion-monger is the worn-out prostitute. This woman is a very serious menace, her methods are so very crude, and her principles conspicuous by their absence. She also often has a large *clientèle*. In my own district was a well-known woman of this class. With the aid of the police a decoy letter was sent to her as follows:—

Dear Mrs. ———

I have got into trouble with a young man, and now he has refused to marry me. I am now three months gone, and I don't know what to do. I was telling a woman about it here the other day. She didn't give me her name, but she told me that if I would write to you you would be able to send me some pills that would do me some good. I am only in lodgings here. Please send them soon, because I don't like my landlady to notice that anything is the matter with me. I want to get rid as soon as possible. I am sending you a 1s. postal order. If they are any more let me know, and I will send it on. The woman that gave me your address seems to know a lot about M——e. I think she once had a miscarriage herself. Hoping you can help me,

Yours affectionately,

LILY THOMPSON,
One in Trouble.

Please do all you can for me.

The above was sent, and per return a letter was received actually written upon the same sheet as the decoy, which was as follows:—

Dear Miss Thompson,

Just received your letter, and I don't take things like that in hand, not knowing you and also the person that has told you about me. I want her name first, also they cost 2/1½ to make them. So you must mention who she is first, and send more on.

Yours,

The name of another prostitute was given as a reference, and the money sent. In a few days the pills were forwarded along with the following letter:—

Dear Miss Thompson,

I enclose pills. You must excuse me for not sending them before, but I have been unable to get stuff, as the druggist had run out. Hoping they will prove successful. You might write back by return, and say if you have got them alright. Keep them in a little box, also in a cool place. Take two night and morning on an empty stomach. If they work you too much, take one off; but if not so much, put another on. You must also tell me when you write how far you are gone, also how old, as I don't make them for anybody if very far.

Hoping you will write by return,

The pills when received smelled very much of oil of cloves, and when examined contained a substance similar to aloes. There was no trace of lead in them. As the case was a suppositious one, the police refused to take any action. It was known that two young women both pregnant, had resorted to this woman, and that their pregnancies did not terminate in the usual manner, also that she had carried this business on for some time. She must have purchased the drugs for the manufacture of her wares locally, and the man who sold them must have known for what purpose they were required.

For a moment let us turn to a more practical aspect of this nefarious trade. The county borough of Barrow-in-Furness has, roughly speaking, a population of between 65,000 and 70,000 people; its sole industry is that of armament construction. There is practically no female labour. The town is a modern one. There are no slums. It is wind-swept and healthy. Employment has been constant and regular for some years past, and for the last twelve months a period of unprecedented commercial prosperity has been experienced.

During the last four years the infant mortality rates and the number of deaths from prematurity were as follows:—

	1911.	1912.	1913.	1914.
Infant mortality rate	110	105	117·7	104
Number of deaths from prematurity	29	33	32	61

It will be noted that, although the infant death-rate fell in 1914 from 117·7 to 104, the number of deaths from prematurity rose from 32 to 61. Of these 41 died during the first week of life, most of them within a few hours. These figures present a striking contrast, and would seem to require further investigation.

From the statements of midwives I gather that a considerable quantity of Hiera Picra (made up locally as a mixture, and sold at the price of 3s. 6d. per bottle), quinine sulphate, and a little diachylon are taken. Further, I

am informed that many women "keep themselves right" by taking liquid extract of ergot regularly each month, and that it is no uncommon thing for the midwives to be asked for their own supplies for this purpose.

Further inquiry reveals circumstantial evidence of unusual interest. For the past few months I have observed the occasional appearance in one or other of the local weekly journals advertisements addressed to married ladies, asking for stamped addressed envelope for particulars.

A stamped addressed envelope was forwarded. Per return of post a printed sheet along with a personal letter were received. The latter read as follows:—

Dear Madam,

Kindly read enclosed list. What is needed sent promptly. If correctives are required to bring on monthly courses will send (if you wish) herbs, powders, and pills, also information, 5s. Done well for others.

Yours faithfully,

The printed sheet contains the following statements:—"State time of suppression, if long not entertained." "Nothing hurtful, nothing illegal, strict confidence." "Will such as derive benefit kindly pass on address to a friend?" "Goods sent to married ladies only." The rest of the sheet is given over to the advertisement of Malthusian appliances.

I have myself observed that on a former occasion the deaths from prematurity were practically doubled after twelve months' continuous advertisement of a like kind addressed to married women.

Before concluding, let me give you the results of a special investigation which I have conducted with the object of obtaining some information concerning the frequency of inquiries for diachylon through the medium of the chemist. Within the past seven weeks I addressed a letter of inquiry to the secretaries of 104 of the principal pharmaceutical associations in this country. The following questions were asked:—

1. Will you please say whether the chemists in your neighbourhood are frequently asked for diachylon in the stick by the lay public without the prescription of a medical man?

Seventy-six societies supplied information; of these 38 replied in the affirmative and 18 in the negative strain, whilst 20 stated that the demand was occasional.

2. Has the local association in your district passed any resolution declining to sell this drug? There were 75 answers, of these 10

associations had passed such a resolution, whilst 65 had not.

3. Have you ever had diachylon offered to you by the travellers of wholesale druggists put up in small sticks to sell at popular prices? Again there were 75 replies, of which 10 were positive and 65 negative.

4. In your experience do you find that "herbalists" or so-called "professors" sell this drug, or do a regular business as abortionists?

5. Could you give me any further information as to the employment of any other drugs for this purpose, such as aloes, colocynth, etc.?

To the latter two questions much valuable information was supplied which it is not possible to summarise satisfactorily.

It should be pointed out that the total number of replies received was 83; of these 6 declined to furnish any information, 21 ignored my letter altogether, although a stamped addressed envelope was enclosed with each set of questions. To each of these a second, and in some cases a third letter was dispatched without eliciting any acknowledgment. This is a matter of some importance, as included amongst this number are some Lancashire towns where the infant mortality rate is very high.

Many of the replies are quite candid, and exhibit a very praiseworthy desire to assist in the suppression of this vicious practice, others are somewhat evasive, whilst others returned answers which are not in accord with my own experience. Added importance attaches to these replies when it is considered that each one represents a district and not the opinion of a single person. It was also noted that those who replied within the first week tendered the most useful information.

One point is of great interest, viz., that out of 75 associations who answered Question 2, only 10 have passed resolutions declining to sell diachylon. I believe the explanation to be as follows:—Most of the local societies have discussed the question and have tacitly agreed not to sell; many of the members of these associations are employed as managers of drug stores, the proprietors of which make it a condition of employment that they shall sell anything and everything. The passing of a resolution would bind these men, and jeopardise their positions with their employers, or debar them from membership of the association. Thus, there is a very weak place in the organisation. This means that diachylon can be easily

procured at drug stores, and also allows the unprincipled chemist to sell it as well.

A favourite method of consuming diachylon in the north-east of England is to take it along with aloes. Whilst supplying one or other substance separately, many of the chemists, and even the drug stores, refuse to sell either, if demanded together. This seems to me a somewhat obtuse attitude. Most certainly the woman intent upon such a purpose will purchase her diachylon at one shop and her aloes at another. If she is to take diachylon at all, it were better that she should take the aloes along with it.

A reference to maps A and B will give a comparative idea how the practice has spread since the year 1906. Map A is copied from Dr. Arthur Hall's paper and indicates the centres where cases of diachylon poisoning have been observed since the year 1893. Map B gives some indication of the demand for diachylon at the present moment, in so far as I have been able to secure answers to my enquiries.

Various measures have been suggested for checking criminal abortion, and one welcomes whole-heartedly the stimulus now given to ante-natal hygiene in the recent memorandum of the Local Government Board. It is unfortunate that our attention seems to have been concentrated upon lead, whilst it is possible that more actual mischief has been wrought by other substances. It has been urged that diachylon should be scheduled as a poison.

Mr. Herbert Gladstone, when Home Secretary, speaking in the House of Commons on April 9th, 1906, said: "The Government were advised that to schedule diachylon as a poison would not mitigate the evil" (*vide* Dr. Hall's paper). If diachylon be placed in the schedule, then all the preparations of lead must be scheduled accordingly. I am informed that already in some quarters where the sale of the substance has been restricted, that there is an increased demand for acetate of lead. Personally, I believe that educative measures hold out most hope. The notification of pregnancy is suggested as the panacea for all these evils. Those who advocate such a step must make sure that it will not actually stimulate foeticide and the doctrines of Malthus. At the present moment it would seem a more practical measure to make all abortions and miscarriages notifiable to the sanitary authority, and to enforce a pathological examination of the foetus and placenta in every such case. Further, when the

State decides to take charge of every illegitimate child, no matter what its social status, much will have been done to kill these ghoulish practices at the very root.

I beg to acknowledge the courtesy of Dr. Hall in permitting me to use the block of his map indicating the centres of diachylon poisoning.

DISCUSSION.

THE PRESIDENT, Dr. Herbert Jones, said that the paper just submitted by Dr. Whitley was one of very considerable importance at any time; but it was of additional importance at the present period from the fact that the Local Government Board was paying special attention to the question of ante-natal conditions. He hoped, therefore, they might have a discussion which would be helpful to them as medical officers of health, and also to the Local Government Board.

DR. W. G. WILLOUGHBY (Eastbourne) said he was sure he echoed the feelings of all present when he thanked Dr. Whitley for the very clear and concise way in which he had put the subject in his paper. This very important subject affected the health of the people from the very beginning. The practices described by Dr. Whitley had been going on to a greatly increasing extent, and he was personally particularly interested in the measures suggested for meeting the evil. Scheduling a few extra poisonous drugs would not, in his opinion, have any good effect. They could not, for instance, schedule all violent purgatives. This question had to do very much with moral considerations. The fact was that motherhood had come somewhat into disgrace in all classes of society. The mother or prospective mother was not respected as she should be; and there would be no improvement until these moral considerations were amended, and we got back to the theory that for a wife to become a mother was creditable. It would help to impress upon the womanhood of the nation the necessity that, when they brought a child into the world, it should be a healthy child, and that that would not be so if they took these drugs.

DR. F. G. BRIEN, on being called upon by the President, said that coming as he did from Canada, and being present only as a guest, he could simply speak of his own experience on this important question. It was not, in fact, debated in Canada in connection with public health work. He had thoroughly enjoyed Dr. Whitley's paper, and should take a copy of it home with him, and hoped it would be a benefit to himself and those of his colleagues to whom he would submit it. Personally, he had often been applied to for help in respect to these matters, and had always taken the course of attempting to get the impression into the lady's mind that she was doing a totally wrong thing for herself and her offspring in taking

drugs. If every medical man endeavoured to do his little all to educate the body politic in regard to this question, much more would be obtained than by way of drastic or domineering legislation.

DR. S. C. LAWRENCE (Edmonton) said that his experience of the use of diachylon as an abortifacient was limited, but in the district of the North in which he found it most under suspicion, the diagnosis was complicated by the fact that there the water supply was very soft; when he saw a woman with blue lines in her gums, it was difficult to determine whether she was a teetotaler or used diachylon!

DR. H. H. I. HITCHON (Heywood M.B.) said he thought that the practices referred to by Dr. Whitley in his paper were much more common than the majority of medical officers of health were likely to appreciate. In his opinion, the attempt to use instruments to procure abortion was much more common than formerly. He did not see how it was possible to enforce the registration of miscarriages. Much more was to be gained in the way of stopping these practices by moral teaching, and by prohibiting the publication of these objectionable advertisements in the Press.

THE PRESIDENT, Dr. Herbert Jones, in thanking Dr. Whitley for his very instructive paper, said that it had been prepared with much painstaking care and thoroughness, and was quite up to the standard of those they were accustomed to listen to in that room. He considered there was no doubt as to lead acting as an abortifacient, not only in the human species, but, as had been shown by Goadby's experiments, also in the lower animals. At one time abortion among women employed in industrial lead processes was a common occurrence, but it had diminished very much of late years coincidentally with the periodical examination by certifying factory surgeons of this class of operatives, and with the greater care exercised in the industry. Among the remedies for lessening the use of abortifacients, the first to be applied should be the prohibition of the thinly-veiled newspaper advertisements. It was difficult to understand why these had been allowed to appear so long, and he agreed with Dr. Whitley that the so-called religious newspapers were the greatest sinners in this connection. It was nothing short of a scandal that abortifacients could so readily be procured from herbalists, and the scandal was accentuated from the fact that these very herbalists were allowed to receive payment from public funds for attending insured persons. This question had been under discussion by the British Medical Association, and it was one which might very properly be considered by the Society in conference with the Association, with the view of recommendations being made to the Government on the matter.

DR. T. W. NAYLOR BARLOW (Hon. Sec.) said there was one point worth bringing out, namely, the number of advertisements which appeared in the Press did not necessarily afford any indication of the amount of genuine abortifacient matter which was sold. He had heard of a woman in a certain portion of his district who was going about selling pills. These pills were alleged to have the property of bringing on abortion. With the help of his lady assistant he procured some of the pills and sent them to the public analyst, when they were found to contain only soap. A great many of these advertising people were simply frauds and quacks who sold worthless and harmless drugs.

DR. C. W. HUTT said he should like to hear the evidence on which Dr. Whitley founded the statement that interference in any way with a pregnant woman was injurious to the foetus and eventually to the child. Although for politic reasons medical officers of health might desire to say that the child or the foetus was injured, that statement unless based on adequate scientific data was likely to do more harm than good. There is another form of mechanical interference which had not been mentioned by the writer of the paper. Dr. Birdwood, who at one time was medical officer to the smallpox ships in the Thames, told his students in the course of his demonstrations that he had been struck on one occasion by an epidemic of abortion that broke out among the women on the ships. Eventually he traced it to one of the patients, a monthly nurse who counselled the ladies to jump from the top of a small flight of three stairs a hundred times a day.

DR. WHITLEY, in replying, tendered his thanks to the President and Dr. Willoughby for their kind and appreciative remarks. With regard to the statement of the former concerning the recognition of unqualified practice under the Insurance Act, he agreed that this recognition gave the herbalist a status which he hitherto did not possess, and increased the difficulties of controlling an acknowledged source of this evil. As to the question of Dr. Lawrence, he knew of no means of distinguishing between diachylon poisoning and chronic lead poisoning, such as might be produced from drinking soft upland surface water contained in lead pipes. In such a case full consideration of all the local circumstances would be the only safe guide. To the question of Dr. Hutt asking for "specific evidence that the ingestion of abortifacient drugs had an evil influence upon the health of the child, in the case of a non-successful abortion," and to the statement "that unless such evidence was forthcoming, such assertions were likely to do more harm than good," Dr. Whitley replied: That from the very nature of the subject

it was difficult to answer such a question, and still more difficult to produce such a number of cases as would possess statistical value. He was able, however, to recall a few cases in his own experience of women having had recourse to such measures giving birth to children of enfeebled intellect. In one case he had had the opportunity of observing a child for fifteen years, which ultimately died from the exhaustion of epilepsy, the mother of which herself acknowledged what she had done, and who regarded the child's condition as a monument to her own infamy. Further, he had at the present moment information regarding some few cases of pregnant women consuming abortifacient drugs, at the present moment, and who were near to their delivery. He proposed to watch the list of birth notifications, and keep in touch with the subsequent history of such cases.

RESEARCHES ON THE STERILISATION OF VACCINE-LYMPH.

DR. M. CALDERINI contributes an interesting analysis of the many researches which have been made in the attempt to search out a satisfactory means of sterilising vaccine-lymph without rendering the vaccine itself impotent. He discusses in detail and with interesting comment the employment of simple storage, of glycerine, heat, cold, desiccation, filtration, dialysis, trituration, Röntgen-rays and radium in sterilising by physico-mechanical means; and of various drugs, such as phenol, corrosive sublimate, lysol, boric acid, toluol, chloroform, ether, and ethyl chloride, as chemical antiseptics. To the last three in particular he devotes attention, on the hypothesis that the antiseptic capacity can best be regulated where the antiseptic is readily volatile and hence easily removed at will.

He concludes that, although there is but little agreement among those working in this field, it may be said safely that the specific substance in calf-lymph vaccine is more resistant to the action both of chemical and of physico-mechanical agents than are the common bacteria—excepting sporing organisms—which are associated with it. Among the physical agents, high pressure and filtration may be proved later to be of practical utility; at present they cannot be adequately regulated. Among the chemical agents those should be viewed with suspicion which when once they are incorporated in the vaccine cannot be controlled until they have finished their disinfecting action. It is natural to suppose that volatile antiseptics, such as chloroform and ether, would be of value for this reason. Dr. Calderini, however, is doubtful whether even these can be trusted to sterilise without causing deterioration. He concludes that glycerine is the most generally trustworthy agent.—*Giornale della Reale Società Italiana d'Igiene*, August 31st and September 30th, 1914. Nos. 8 and 9.

REPORT FOR 1913-14 OF THE MEDICAL OFFICER TO THE LOCAL GOVERNMENT BOARD.

THE annual report for 1913 of the Medical Officer of the Local Government Board provides reading of exceptional interest. Reference will be made here mainly to the important sections on infant and child mortality, tuberculosis and venereal diseases.

The section on infant and child mortality indicates the possibilities of development which lie in this field of work. Its scope has scarcely yet been realised by the public health service. Even so, however, the movement initiated first by reports of individual medical officers of health, and then by special reports from the Local Government Board and from other sources, has resulted in progress which is astonishing when the facts are brought together in a report.

Dr. Newsholme indicates the important rôle of measles, bronchitis, whooping-cough, and respiratory diseases on the one hand, and of causes operating at or before the birth of the infant on the other, in influencing infant and child mortality. The tally of venereal diseases is notoriously incomplete, but even so these are responsible for one per cent. of the total deaths under five. Besides being far from complete as a record of the amount of overt venereal disease this estimate represents only a fraction of the damage done by syphilis, which is a common cause of still-birth, of premature birth, and to some extent of marasmus and atrophy.

Stress is laid on the prime need for early information of birth if measures to diminish infant mortality are to have their full effect. The rapid extension in the adoption of the Notification of Births Act has naturally been accompanied by a great increase in the number of health visitors. Reference is made to the advisability, especially in county areas, of making the health visitor also assistant inspector of midwives, tuberculosis nurse, infant visitor, and perhaps school nurse, thus economising in the time and money spent in travelling, while preventing overlapping and multiple visits.

As illustrating the scope for ante-natal work, Dr. Newsholme shows that, taking Dr. Routh's estimate of four abortions to one still-birth, the total ante-natal mortality is 150 per 1,000 births, that is, considerably higher than the total mortality in the first year after birth. "From evidence published by the Royal Commission, it appears likely that one-half of this ante-natal mortality is ascribable to syphilis. To this ante-natal mortality must be added the large proportion of infant mortality after birth, due to ante-natal accidents and disease."

A comparison of the fertility rates and rates of infant mortality in various social grades of the population leads to interesting results. While in most grades variation in one rate has been associated with a variation in the same direction in the other, in the case of textile workers a fertility rate below the average for the country is associated with an infant mortality rate well above the average. This appears "to be consistent with the view that, outside the range of extreme poverty, there is no unavoidable relationship between a high birth-rate and high rate of infant mortality."

As is natural, tuberculosis is dealt with at length. To secure complete co-ordination between the dispensary officer and the public health department of the local sanitary authority it is suggested that the former should be appointed an officer of the sanitary authority at a nominal salary or without salary, to assist the medical officer of health in carrying out work under the Tuberculosis Regulations. Among counties this has been done completely in Worcestershire and in part in Durham. A hope is expressed that these examples will be followed elsewhere.

In regard to the supervision and after-care of the tuberculous important suggestions are made for the formation of care committees. These should be under the ægis of the county or county borough council, and should be in close touch with the local medical officer of health and with the dispensary officer. They should deal with both insured and uninsured. The local charitable organisations, insurance committee, board of guardians, county or county borough council should be represented, and the medical officer of health and dispensary officer should be *ex officio* members. The care committee should deal with matters referred to it by the medical officer of health or dispensary officer in relation to supply of food, suitable work, assistance with rent to allow the patient to sleep in a separate bedroom, provision of bed, bedding, clothes, etc. The scheme is an interesting one, likely to be fruitful in application. Probably in some areas it will prove to be more convenient to utilise the services of local charitable aid societies already in being, rather than to form a new committee with similar functions. The privacy necessary would be scarcely less respected in one case than in the other.

In an illuminating passage Dr. Newsholme deals with the remarkable increase in hospital accommodation in this country during the past few decades. Between the years 1870 and 1912, the proportion of deaths occurring in workhouses and infirmaries rose from 5.6 to 11.3 per cent. of the total deaths in England and Wales; in hospitals from 2.0 to 8.0 per cent., and in lunatic asylums,

from 0.7 to 2.3 per cent. In 1912 over one-half of the male and not much less than one-half of the female deaths from pulmonary tuberculosis on London occurred in hospitals and workhouses; the same is true for approximately one-third of the male and one-fifth of the female deaths from this disease throughout England and Wales. The percentage of deaths in institutions is markedly higher in urban than in rural areas.

The degree in which hospitals relieve the situation set up by the anomalous housing conditions in towns is shown by a comparison of the housing and of the overcrowding in urban and in rural districts respectively. Over eight times as many of the urban as of the rural population live in one-roomed tenements, and nearly twice as many of the urban as of the rural population live in two-roomed tenements. The overcrowding is seven times as great in urban as in rural one-roomed tenements, and twice as great in urban as in rural two-roomed tenements. Dr. Newsholme's comment is that "These facts have much significance in relation to the greater use of hospitals in urban than in rural districts. There can be no reasonable doubt that, were it not for the greater use of hospitals in urban districts, the excess in their death-rate over that of rural districts would be much higher than at present."

The report contains a special section on venereal diseases. An abstract of Dr. Johnstone's report to the Local Government Board is given, and reference is made to the labours of the Royal Commission on Venereal Diseases now in session. In regard to ophthalmia neonatorum attention is drawn to the surprising differences in incidence between urban and rural areas, and between various urban districts.

The appendix contains interesting reports, notably those by Dr. Fletcher on a scarlet fever outbreak attributed to milk in a rural district; by Dr. Macewen on an outbreak of diphtheria in South London attributable to milk, and of smallpox in an urban district, related to infection in a cotton-mill; and by Dr. Seymour on lead poisoning in an urban district in relation to the public water supply. Mention must be made also of researches by Dr. Blaxall on methods of purifying and of preserving calf lymph; by Dr. Andrewes on arterial degeneration—a continuation of the report made in 1912; and by Dr. Rajchman on the possibilities of serological diagnosis of scarlet fever.

VIRULENT SMALLPOX IN MEXICO.—An epidemic of virulent smallpox was reported present at Vera Cruz, on January 5th, 1915. The disease which was imported by the military was said to be spreading rapidly. Smallpox was also reported as having occurred at Ciudad Juarez on December 4th, 1914.

REVIEW.

A STATISTICAL STUDY OF ORAL TEMPERATURES IN SCHOOL CHILDREN, WITH SPECIAL REFERENCE TO PARENTAL ENVIRONMENT AND CLASS DIFFERENCES. M. H. Williams, Julia Bell and Karl Pearson. Dulan & Co., London. 6s. net.

In this memoir data as to temperature collected from certain elementary schools in Worcestershire are compared with others from a home for the daughters of soldiers and from certain public schools for boys and girls. Save in one set of observations the thermometer was kept in the mouth for ten minutes to secure constant results, but it is not quite clear what precautions were taken with regard to mouth-breathing and to the immediately previous occupation of the children, both of which factors have material effects on the temperature records. Taking groups of children into consideration, the time of day at which the temperature was recorded and the influence of environment had little effect on the average result though variations of an individual character naturally occurred. The authors conclude that there is a real and marked difference in temperature between the children of the higher and lower social classes, due not to conditions of environment or of nourishment, but to the far greater prevalence of certain pathological conditions in the poorer children.

The pathological data are derived from medical inspection of children in the area of Worcestershire in which the first-named author is a medical officer. She finds "rheumatism" and "puerile phthisis" very prevalent, and concludes that rheumatism is markedly hereditary, and that puerile phthisis is in part hereditary, but in part due to infection in school or to a school environment, favouring the development of an infection received elsewhere.

The data recorded are, however, of an unusual character, since it appears that three-quarters of the children in the group of "leavers," age 12-13 which was under observation, were deemed to be suffering either from phthisis or rheumatism or to present signs leading to a suspicion of the presence of those diseases.

From the reports of the chief medical officer of the Board of Education it appears that the percentage frequency of phthisis in Worcestershire was 4.18, as compared with percentages for other counties of under 1 per cent., and the explanation is appended that this is due to one of the assistant medical officers diagnosing pulmonary tuberculosis in about 15 per cent. of the children examined. The evidence, regarded as pathognomonic by this medical officer, understood to be the author of this memoir, must be different to

that so regarded in other areas, and her proofs presumably must include conditions entered elsewhere under other headings than phthisis or rheumatism or even, perhaps, not regarded as constituting a noteworthy deviation from the normal.

Such a grouping might explain why "the elementary school children do not show the marked variation we might have anticipated from the prevalence of pathological states," and also "the relatively low correlation between parent and child for phthisical diathesis, and the non-parallel results for boys and girls of the same school (which) suggest that the source must be sought primarily within the schoolroom itself and only secondarily in the home."

CORRESPONDENCE.

The Editor does not accept responsibility for the opinions of correspondents.

THE PRESIDENTIAL ADDRESS.

To the Editor, PUBLIC HEALTH.

SIR,—I have only recently had an opportunity of reading the Presidential Address delivered before the Society in October last. Having recently held the appointment of deputy assistant director of medical services to a Territorial division, I can fully appreciate the importance of the suggestions put forward in the address relating to the sanitary service of the Territorial Force. I wish at the outset more particularly to endorse the opinion that the *à la suite* sanitary service should be organised on a geographical basis. The point to aim at is to establish *areas* rather than *personnel*, and, in order to include the whole of Great Britain eventually, to make the *areas* contiguous. This is putting the matter very briefly, for it is impossible to go into detail here, though one may add that the *personnel* of the service must obviously be drawn from that of the civil health service, for the time being, of the several areas. It is obviously impossible for assistant directors of medical services of divisions to administer this service or define the duties of officers belonging to it; an assistant director of medical service division is concerned with *unit* sanitation, whereas the *à la suite* officer is concerned with sanitation within an *area*. The chief sanitary officer of an area should be in direct communication with the headquarters staff of the military command in which his area lies, and for the purposes of this service might well be appointed *à la suite* of this staff. The suggestion that officers of the various branches of the civil public health service might be more intimately associated with the military medical service in other directions seems particularly sound. The public health officer is well acquainted with routine and

administration, matters foreign to the majority of general practitioners, but of prime importance in military medical work; so the public health officer, if afforded a training on what may be called a "Territorial" basis, could very rapidly acquire the technical knowledge required of those in charge of military medical units, or of combatant units. The expansion of the medical service on the outbreak of war has to be enormous and rapid, consequently any systematic method which can be adopted in peace which aims at training a personnel for taking over certain defined duties on the outbreak of war must materially assist the military authorities in their task, and will go far to avoid the employment of hastily-recruited personnel in unfamiliar situations.

I am, Sir,

Yours obediently,

J. H. P. GRAHAM,

Fellow, Society of Medical Officers of Health.
Wallasey, Cheshire.

January, 1915.

SCHOOL IN RELATION TO THE
HYGIENE OF THE EYE.

DR. A. POLATTI deals with the relation of school-life to affections of the eye. As regards myopia, he concludes that (a) myopia is but rarely found at the beginning of school-life; (b) its frequency increases with each standard reached, until in certain districts and in certain forms of study it attains remarkable proportions; (c) in addition to an increase in frequency, myopia shows an increase also in intensity with advancing age in school; (d) myopia is far less frequent in country than in town schools, which he suggests as an argument in favour of open-air schools.

In suggesting measures to minimise the risk of producing myopia, Dr. Polatti makes due allowance for the influence of heredity in producing an eye peculiarly liable to succumb to the strain of use in school. As precautionary measures he suggests that the lighting should in the first place receive attention. The windows should be high and their lowest points reach to a distance of a yard from the floor. Each scholar should be able to see a strip of sky thirty centimetres deep. The light should come from the left. In feeble lighting writing should always replace reading as a lesson. The type of the school-books should receive attention, and exact data are given in this respect.

Dr. Polatti also discusses the occurrence of astigmatism, strabismus, conjunctivitis, and trachoma in school-life.

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PROCEEDINGS OF THE SOCIETY OF
MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856.

RECONSTRUCTED 1888.

INCORPORATED 1892.

AN Ordinary Meeting of the Society was held at the Offices of the Society, No. 1, Upper Montague Street, Russell Square, London, W.C., on Friday, January 8th, 1915, at 5 p.m. *Present:* Dr. Herbert Jones, President (in the chair), and Drs. E. H. Snell, T. Ridley Bailey, George F. Buchan, A. K. Chalmers, Chas. Porter, H. Handford, A. B. McMaster, S. C. Lawrence, T. W. N. Barlow, C. Sanders, H. R. Kenwood, J. B. Wilkinson, A. A. Mussen, R. E. Lauder, W. H. Symons, W. G. Willoughby, J. T. C. Nash, H. H. I. Hitchon, A. Mearns Fraser, J. Priestley, A. Ashkeny, S. N. Galbraith, J. P. Walker, G. E. Oates, W. A. Berry, T. S. Higgins, H. P. Newsholme, C. W. Hutt, J. J. Jervis, R. Veitch Clark, and R. Dudfield; W. Whitaker, Esq. (Associate), and Mr. F. G. Brien, visitor.

Minutes.—The minutes of the previous Ordinary Meeting, held on Friday, November 13th, 1914 (*vide* PUBLIC HEALTH, December, 1914, page 70), were taken as read, were approved and duly signed by the Chairman.

Election of Fellows.—The following candidates, who had been duly nominated, were balloted for, and were declared by the President to be duly elected, viz.:—

Fellows.—Donald James Clark, M.B., Ch.B., 10A, Hay Lane, Coventry, Warwickshire and Coventry (Tuberc. Officer); Gilbert Elliott, M.R.C.S., L.R.C.P., D.P.H., D.T.M., The Castle, Winchester, Hampshire (Assist. M.O.H.); Colin James Galbraith, M.B., B.S., M.R.C.S., L.R.C.P., D.P.H., The Castle, Winchester, Hampshire (Assist. M.O.H.); Wm. Nicol Watson Kennedy, M.B., Ch.B., D.P.H., Town Hall, Croydon, Croydon C.B. (Assist. M.O.H. and S.M.O.); John Harold Mason, M.B., Ch.B., D.P.H., 43, St. Matthew's Parade, Northampton, Northamptonshire (S.M.O.); Thomas Ruddock-West, M.B., B.S., D.P.H., Municipal Buildings, Norwich; Norwich (Assist. M.O.H. and S.M.O.); James Todesco, M.D., M.R.C.S., L.R.C.P., D.P.H., Borough Hospital, Croydon, Croydon C.B. (Assist. M.O.H.); Arthur George Troup, M.D., D.P.H., 2, London Road, Basingstoke, Hants., Hampshire (Assist. M.O.H.).

Nominations for Election.—Several nominations for election to the Fellowship of the Society were read.

DR. W. F. J. WHITLEY then read a paper on "Criminal Abortion and Abortifacients,"* and the subsequent discussion was contributed to by the President, and Drs. W. G. Willoughby, F. G. Brien, S. C. Lawrence, H. H. I. Hitchon, T. W. N. Barlow, and C. W. Hutt. Dr. Whitley replied.

CAPTAIN REGINALD DUDFIELD said he had been asked by the Commanding Officer of the 2nd London Sanitary Corps to say that he was in want of officers at present, because all those who

*Published in the present issue.

had previously joined had been sent abroad, and were working their way from the base right up to the front. They had, therefore, vacancies for men who had sanitary experience, and he appealed to members to come forward as volunteers since they should do their best, as medical men, to keep our soldiers fit to fight the enemy. The work of the sanitary staff was quite as important as other divisional duties.

The meeting then adjourned.

Home Counties Branch.—A meeting of this Branch was held at 1, Upper Montague Street, Russell Square, at 4 p.m., on November 26th, 1914. Those present included Dr. S. C. Lawrence (in the chair), Drs. Linton, Benton, Ball, Kirkhope, A. E. Porter, Estcourt-Oswald, H. P. Newsholme, Buchan, Beale Collins, Ashby, and Strain.

The minutes of the last meeting were read and approved.

Apologies for absence were read from Drs. Crookshank, Bannerman, Thresh, Holroyde, Prior, Foulerton, and Pierce.

DR. BEALE COLLINS moved and DR. PORTER seconded the following recommendation of the Consultative Committee:—"That the Home Counties Branch refer to the Society for the consideration of the Council the question of remitting, in whole or in part, the subscriptions of certain members engaged with His Majesty's Forces." This was carried.

Dr. Ashby (Hon. Treasurer) then presented his annual statement for 1913-14 on the financial state of the Branch. The report of the Hon. Treasurer was adopted, the PRESIDENT referring to the valuable work of Dr. Ashby to the Branch.

The next business on the agenda was the consideration of the reference from the Finance Sub-Committee:—"The letter from the Departmental Committee on building bye-laws, together with a copy of its terms of reference." The following members contributed to this discussion:—Drs. Lawrence, Porter, Ashby, Beale Collins, Oswald, and Buchan.

The following resolutions were carried:—

1. That this Branch is in possession of no evidence that the development of estates, whether in urban or rural districts, has been hampered or unduly restricted by the operation of bye-laws made by local authorities under the Public Health Acts; this Branch further considers that the public health would be adversely affected by any relaxation in the clauses of the present model bye-laws that deal especially with the sanitary condition of dwellings designed for human habitation.
2. That this Branch is of opinion that in building bye-laws provision should be made for the following matters:—

- (a) Plans of buildings proposed to be erected should be deposited (in duplicate) with the local authority at an adequate interval of time to allow of their proper examination before the meeting of the authority at which such plans are submitted for approval.
- (b) No house should be erected to which a secondary means of access is not provided.
- (c) The exercise by rural authorities of control over the quality and nature of the materials used in the erection of the walls of houses.
- (d) The exercise by local authorities of control over the materials used for or on the internal surfaces of dwelling-houses.
- (e) The provision in every house, in a suitable position, of an adequately lighted and ventilated larder.
- (f) The provision in every house, in a suitable and convenient position, of a sufficient bath with proper fittings and waste-pipe.
- (g) That in all districts where a gravitation water-supply is available for each house a tap should be provided direct from the main, and suitably placed over the sink, which sink should have a proper waste-pipe.
- (h) The exercise of control by local authorities over the construction of wells for the supply of water for domestic purposes.
- (i) The provision of a sufficient area around and about stable premises, which shall be properly drained and covered with a sufficient depth of hard, smooth, and impervious material.

The usual monthly meeting of the above Branch was held at the Society's Rooms, Russell Square, on December 17th, 1914, at 4 p.m., when the following members were present:—Drs. Beale Collins, Hewlett, May, Thomas, Kirkhope, A. E. Porter, Buchan, Stevens, Newsholme, Strain, and Veitch Clark. Dr. McConnell was present as a visitor. In the absence of Dr. Lawrence, the President, Dr. Beale Collins took the chair.

Apologies for absence were read from Drs. Lawrence, Laird, Greenwood, Paget, and Hyslop Thompson.

The Hon. Secretary was instructed to convey to Dr. Paget the sympathy of the Branch on the gallant death of his only son while leading his men at the Battle of the Aisne.

The next business was the consideration of a motion of which due notice had been given by DR. BEALE COLLINS. This motion was supported

by DR. PORTER, and was carried in an amended form as follows:—

"That the Council be asked to consider the possibility of a motor ambulance being presented to the French Red Cross or other like society or agency of the allied forces who may be in need of help, as a gift from the members of the Society, each member contributing voluntarily to a special fund."

The next matter for consideration was Dr. Hyslop Thompson's paper on the "Care and Control of Tuberculosis Patients." It was felt, however, that, in the absence of Dr. Thompson, the subject was likely to give rise to such interesting discussion, that the reading of the paper had better be postponed till an occasion when Dr. Thompson is present. The members thereafter adjourned, on the invitation of the Metropolitan Branch, to hear Dr. Davies on his experiences as a prisoner of war in Germany.

Metropolitan Branch.—This Branch met at No. 1, Upper Montague Street, Russell Square, W.C., on Monday, December 17th, 1914, at 4 p.m. *Present:* Major Caldwell Smith, R.A.M.C.T. (in the chair), Drs. Sidney Davies, C. J. Thomas, D. L. Thomas, Bond, King Brown, Spaul, Higgins, Roberts, Whitehouse, New, Macdonald, Jackson, and Porter (Hon. Sec.).

A considerable number of the members of the Home Counties Branch also attended to hear Dr. Davies (Woolwich) and Dr. C. J. Thomas (London County Council), both of whom had been detained in Germany for some time after the outbreak of war, relate their experiences. The stories proved to be exceedingly interesting, and were greatly enjoyed. On the motion of DR. HIGGINS, seconded by DR. ROBERTS, a cordial vote of thanks was accorded to both speakers.

Yorkshire Branch.—A meeting was held at the Town Hall, Wakefield, on December 2nd, 1914.

In addition to the president, Dr. T. Gibson, there were present the following members:—Drs. Angus (Leeds), Arbuckle (Thorne), Buck (Rothwell), Bullough (Wakefield), Halliwell (Dewsbury), Jefferson (Ripon), Jubb (Wakefield), Marsden (Lightcliffe), Martin (Brighouse), Milne (Mirfield), Moore (Huddersfield), Pearce (Batley), and J. R. Kaye, Hon. Sec. (Wakefield).

After the minutes of the previous meeting had been read, Dr. GIBSON gave his Presidential Address on "The Public Health, a Retrospect and a Prospect."

A communication from the Central Society with regard to the Building Bye-laws was referred to, and the discussion adjourned to the next meeting.

The members then visited the Wakefield Sewage Works where the experiments on the treatment

of sewage with activated sludge were explained by the city surveyor (T. P. Wakeford, Esq., M.I.C.E.). The experiments are based on those carried out in the laboratory of the Davyhulme Sewage Works, Manchester, by Messrs. Ardern & Lockett, working under the direction of Dr. Gilbert Fowler. These experiments have shewn that the resultant solid matter obtained by prolonged aeration of sewage, which has been termed "activated sludge," has the property of enormously increasing the purification effected by simple aeration of sewage. The Wakefield experiments have fully confirmed the results obtained at Manchester and Salford, and have shewn that the method is capable of not only turning out a most satisfactory effluent but also a sludge with a high nitrogen content, and therefore of considerable manurial value. Sludge from the humus tanks of the existing works was activated by continuous agitation by compressed air for nine days. When sewage is added to this activated sludge (which must form 25 per cent. of the tank contents) and aeration continued for three to four hours, followed by subsidence, an effluent is obtained shewing 90 per cent. purification on the oxygen absorbed figure. The dried sludge gives the nitrogen content as high as 4.59 per cent. Air is supplied at the rate of $\frac{1}{4}$ th of a cubic foot per square foot of tank area per minute.

The Wakefield sewage is a heavy one, containing about 50 per cent. of trade waste. The experiments are about to be repeated on a larger scale.

On returning to the Town Hall the members partook of tea.

North-Western Branch.—The monthly meeting was held in Manchester, on December 18th, 1914, at 3.30 p.m. *Present:* Dr. A. A. Mussen (President), Drs. H. H. I. Hitchon, J. W. Talent, J. J. Butterworth, E. Sergeant, R. Sydney Marsden, W. Allen Daley, Meredith Young, T. W. N. Barlow, A. Middleton Hewat, W. Stewart Stalker, G. W. N. Joseph, G. Granville Buckley, Cecil Berry, Cyril Banks, Jean R. Shaw, Alex. Welch, James A. Harris, James B. Wilkinson, A. E. Brindley, G. Jessel, F. Webb, W. F. Dearden, and A. B. McMaster. Apologies for absence were read from Drs. J. Wheatley, H. Peck, J. Cates, T. W. H. Garstang, and J. Allen.

The HON. SECRETARY suggested the desirability of the Branch contributing to some medical relief work in connection with the European war. DR. SERGEANT proposed, and DR. MEREDITH YOUNG seconded, and it was resolved, "That a contribution of £5 5s. be sent from the Branch to the Belgian Doctors' Relief Fund."

DR. T. W. N. BARLOW then read a very interesting paper on "The Milk and Dairies Act, 1914," which was followed by a long discussion,

in which Drs. Sergeant, Meredith Young, W. Allen Daley, and the President took part. Those present having expressed their appreciation of the paper, DR. BARLOW briefly replied. DR. SERGEANT raised the question of the importance of the regulations which the Local Government Board had power to make under the Act, and on his proposition, seconded by the Hon. SECRETARY, it was resolved:—"That the Council of the Society be asked to approach the Local Government Board, so that the proposed regulations under the Milk and Dairies Act, 1914, might be expedited, and, if possible, ready to come into force at the same time as the Act."

North-Western Branch.—The monthly meeting was held in Manchester on January 15th, 1915. Present: the President (Dr. A. A. Mussen), Drs. G. Jessel, F. Webb, W. Hamilton, R. Sydney Marsden, A. Middleton Hewat, W. Allen Daley, W. G. Burton, G. Granville Buckley, G. H. Leigh, J. B. Wilkinson, E. Sergeant, C. Banks, C. Berry, C. W. Gee, J. Cates, A. Stalker, H. H. Hitchon and W. F. Dearden.

Apologies for absence were read from Drs. Wheatley, Brindley, Peck, Meredith Young, Garstang, Barlow and the Honorary Secretary. The minutes of the previous meeting were read and confirmed, after which a written report from the Hon. Secretary with reference to the Council Meeting held on the 8th of January was read and received. The President apologised for Dr. Barlow's absence, and it was decided that the presentation to him should take place at the February meeting.

DR. GEORGE JESSEL, Wigan, then read a very interesting paper on "The Work of a Tuberculosis Department."

An instructive discussion followed, in which the President and Drs. Sydney Marsden, Cates, Daley, Hewat and Banks took part. A vote of thanks to Dr. Jessel terminated the proceedings.

APPOINTMENTS.

DR. H. R. BEALE has been appointed medical officer of health and school medical officer of the borough of East Retford.

DR. VINCENT BURROW, of Wellow, Somerset, has been appointed temporary assistant school medical officer of Wiltshire.

DR. R. M. COURTAULD has been appointed assistant county medical officer of health of West Suffolk.

DR. OCTAVIUS HALL, medical officer of health of Devonport, has been appointed whole-time acting medical officer of health of the Borough of Plymouth, until a permanent appointment is made.

DR. SYDNEY E. MURRAY has been appointed assistant school medical officer of Sunderland.

DR. H. F. PERCIVAL has been appointed medical officer of health of Northampton R.D.

DR. M. B. G. SINNETTE, of Greenock, has been appointed assistant medical officer to the Bradford Education Committee.

LAW REPORTS.

HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.

November 25th, 1914.

BEFORE RIDLEY, AVORY, AND LUSH, JJ.

GUILDFORD CORPORATION v. BROWN.

Rag Flock Act, 1911—Mattress—Remaking—Old Flock in New Cover.

A person who puts flock from an old mattress into a new cover is thereby making bedding, and if the flock is not up to the required standard of cleanliness he commits an offence.

This was a case stated in the hearing of an information laid on behalf of the Guildford Corporation, acting as sanitary authority, charging the respondent Brown with having in his possession flock manufactured from rags intended to be used for the purpose of making articles of upholstery or bedding, which flock did not conform to the standard of cleanliness prescribed by the Local Government Board. The respondent was remaking two mattresses for a customer. The same flock was being used, but it was to be placed in new covers. The samples taken did not come up to the standard of cleanliness required.

The respondent relied on the case of "Gamble v. Jordan" [1913], 3 K.B., 149, and said that, according to that decision, the Rag Flock Act, 1911, did not apply to the work he was doing. The justices took this view, and dismissed the information.

The Court allowed the appeal, and sent the case back to the justices with a direction to convict.

RIDLEY, J., said that this case was to be distinguished from "Gamble v. Jordan." In that case the old flock was to be replaced in the same cover from which it was taken, and it was held that such an operation did not amount to the making of a mattress. The putting of the old flock into a new cover did amount to a manufacturing of a mattress.

AVORY, J., stated, in reference to the earlier case, that in the judgments it had been clearly indicated that the using of new material either in the flock or cover would bring the case within the Act.

LUSH, J., agreed.

SANITARY OFFICERS REQUIRED FOR THE FRONT.

1st London (City of London) Sanitary Company.

OFFICERS are urgently required (Medical men holding the D.P.H.) for the 2nd "Reserve Unit" for Sanitary Service at the front. Pay is on the full R.A.M.C. Scale, and Special Grants are made for the Uniform and Kit. Full particulars may be obtained on application to Capt. Reginald Dudfield, R.A.M.C.T., 19, Blomfield Road, Maida Vale, London, W.

Public Health

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EPIDEMIC CEREBRO-SPINAL MENINGITIS.

EPIDEMIC cerebro-spinal meningitis is by no means a new disease. There is good reason for believing that certain epidemics in the 1st, 2nd and 7th centuries in Italy, described in the works of Aretæus, were of this nature. Nevertheless, according to the medical historian Hirsch, it has only been known as a widespread epidemic disease in Europe and America since 1805, especially between 1805 and 1830. The subsequent history of the disease was marked by short quiescent periods with sporadic cases, followed by epidemics which occurred in the years 1835-1850, and again from 1854-1875. This last was much the largest outbreak. From 1875 onwards the disease has never been absent, sporadic cases cropping up, and at times exacerbations have appeared of the nature of small epidemics. Thus in the winter 1906-1907 we had an outbreak in the British Isles with a high fatality.

Progress in dealing with this disease from an administrative point of view naturally dates from the discovery of its cause by Weichselbaum in the year 1887. He isolated the specific bacterium, known as Meningococcus, from several sporadic cases, and with the advent of the next epidemic it was proved also to be the cause of the epidemic form. It may be well at this juncture to say a few words regarding the characters of this micro-organism. It is a Gram-negative diplococcus closely related to Gonococcus, which it resembles in its morphology and cultural characteristics. Fortunately, the differential diagnosis of these two bacteria is not often a pressing matter. The bacteriological diagnosis of Meningococcus depends upon the following points. It grows fairly well on artificial media containing blood serum, moderate-sized colonies appearing on plates within 24 hours at 37°. It fails to grow entirely at room temperature (22°), which distinguishes it from several other kinds of Diplococci with which it may be confounded.

The colony is easily lacerated with a platinum needle, whereas in the case of Micrococcus catarrhalis it is so extremely viscid that it can be pushed along as a whole without rupturing

it. The colonies are never confluent, as is often the case with Gonococcus. In serum broth containing sugars it is found that the medium becomes acid to litmus in the case of maltose and glucose, but cane-sugar is not fermented; Gonococcus, on the other hand, ferments glucose but not maltose. Too much reliance, however, must not be placed on this test, since some strains of Meningococcus have been isolated which do not ferment maltose and some of Gonococcus which do. It has been found in practice that in order to get an early appearance of acid production it is necessary to bring the reaction of the medium within close range of the neutral point of litmus, by the addition of acid, otherwise a considerable quantity of the acid first formed from the sugar is absorbed by the proteins of the serum, without a corresponding change in the reaction of the substrate. Another important means of distinguishing Meningococcus from its congeners is the ease with which it can be emulsified in salt solution. Gonococcus makes a bad emulsion, and Micrococcus catarrhalis agglutinates spontaneously. We now come to agglutination by means of a specific serum, a test which has proved so helpful in the case of many bacteria. For some reason, with which we are not familiar, it is only a partial success when applied to Meningococcus. Some strains are very refractory, showing little or no agglutination, except with their own anti-serum, but it is usually found that strains from the same epidemic are agglutinated by the anti-serum of any one of them. In difficult cases it has been found that a positive result can often be obtained by conducting the experiment at 50°-55° C. and allowing a considerable interval of time—24 hours. The fact remains, however, that divergencies in the behaviour of different strains are more in evidence than is the case with most other bacteria.

It is worth mentioning that other bacteria may cause meningitis which may be indistinguishable clinically from the meningococcal form, namely, Pneumococcus and Streptococcus, but is important to note that they do not give rise to the epidemic form of the disease, although an accumulation of cases can naturally occur at times, just as we see in the case of pneumonia or pneumococcal angina. Lastly, it

must be pointed out that the tubercle bacillus accounts for a certain number of cases, but this is a sign of a general infection, fed from some local focus, and always terminates fatally in about three weeks.

Epidemics have, for the most part, broken out amongst collections of individuals, for instance, in barracks, gaols, convicts' prisons, orphanages, workhouses, asylums, mines, boarding-houses and schools. There is a special seasonal prevalence—winter and spring months, with a maximum about April, and then gradually falling off to a minimum at the beginning of the autumn. This distribution is just what we should expect because it coincides with the period when catarrhal throat conditions are rife. The coughing, sneezing and spitting associated with colds and sore throats form a ready means of transferring Meningococcus from one individual to another in institutions where people are crowded together. The site of election of the micro-organism is the naso-pharynx, and if an examination of the secretion is made during the first five days in cases of meningitis 70 per cent. and upwards of positive results are obtained. In the second and third weeks of the disease the percentage gets progressively less, until after the end of the third week the majority of the patients are free from the specific bacteria. Naturally isolated cases exist which harbour the coccus for a much longer time. The examination is usually made by introducing a swab on a bent probe through the mouth and suitable media are inoculated immediately. It is a fact of the first importance to realise that Meningococcus, like Gonococcus, is an exceedingly frail bacterium. This point is often not sufficiently appreciated by clinicians about to make a bacteriological investigation of a case. It is very easily killed by drying, lowered temperature, light and so on, and therefore it cannot be too strongly urged that the material must be transferred to artificial media without delay and straightway put in the incubator. The sending of swabs by post gives all the above factors an opportunity of action and militates greatly against the successful culture of the micro-organism.

Meningitis is essentially a disease of children. The vast majority of cases—80 per cent. to 90 per cent.—are in persons under 15 years of age. In the epidemics that have occurred in barracks the infected have been for the most part young recruits between the ages of 18 and 24 years. Most of the patients suffer with a naso-pharyngeal catarrh, and it is now pretty generally accepted that Meningococcus is the cause of, or at any rate takes part in, this lesion. Many cases never progress any further, others have a severe sore throat and headache, and we have to admit that Meningococcus is not really a very virulent

micro-organism in man. It is only in a relatively small proportion of cases of young persons, whose resistance doubtless has been reduced by other factors, that the micro-organism gains access to the central nervous system *via* the blood stream. It is then found in the cerebro-spinal fluid and meningeal pus from the spinal cord and brain. The fatality in recent epidemics of meningitis has been uniformly high—about 70 per cent. In America the death-rate has apparently been greatly reduced of late years by the administration of anti-serum, but up to the present this treatment does not seem to have met with marked success in Europe, although it is probable that it has not yet had a sufficiently extended trial.

There still remains to be considered the question of carriers. There is no doubt that many people receive Meningococcus into the naso-pharynx and show no symptoms whatever. A large number of such "contacts" have been examined, and it has been possible to show that they harbour the coccus for about three weeks, after which time they are free in the large majority of cases—that is to say, for about the same period as do patients who have definitely suffered from meningitis. It has been found in several such "contacts" who have been followed from the time of infection that, after remaining perfectly healthy for a week or two, meningitis has suddenly supervened, and this is just what we should expect. It proves, moreover, that the particular strain of organism with which these people are infected is by no means an attenuated one, but that they must be looked upon as a real danger to the community in that they are potential sources of infection. The limitation of the period of infectivity to three weeks in most of the cases is therefore an important point in practical politics. In families which have been exposed to infection, Meningococcus has been most often found in the elder members, and especially the father. Thus the tendency is for the parents to be carriers and the children to get the disease. In conclusion, it may be pointed out that it is doubtful whether we should look upon these "contacts" as carriers in the true sense of the word, or rather in the light in which typhoid carriers are regarded. The typhoid carrier has a *depôt* somewhere in his body, often the gall bladder, from whence a continuous stream of bacilli issues, to be excreted in the *fæces* or urine. He may be a source of danger for an indefinite time, often extending over years. He has in most cases passed through an acute or subacute attack of the disease. The meningitic "contact," on the other hand, has had a chance infection of which he usually rids himself in a short period. Even in the convalescent Meningococci are unable to retain a foothold and rapidly disappear.

INVESTIGATIONS INTO THE PERIODICITY OF INFECTIOUS DISEASES BY THE APPLICATION OF A METHOD HITHERTO ONLY USED IN PHYSICS.

By JOHN BROWNLEE, M.D., D.Sc.

BEFORE speaking definitely of the periodicity of disease there are two subjects on which a few preliminary remarks are necessary. The first is the method of investigation, and the second the nature of what in physics is known as "interference." The method which is employed to investigate the periodicity of phenomena is that invented by Professor Schuster. It is known by the name of the "periodogram." In some of its applications it is difficult, but the main principle is easily understood. This can be directly illustrated by an example. If we take an obviously periodic series, 1, 2, 3, 4, 5, 6, 7, 6, 5, 4, 3, 2, 1, 1, 2, 3, 4, 5, 6, 7, 6, 5, 4, 3, 2, 1, etc., there is no difficulty in seeing that there is a definite period of thirteen terms. In practice, however, the length of the period is not so obvious. To show the working the assumption may be made that in the case given above, the period consists of twelve terms, and the method applied on this hypothesis. This is shown shortly in Table I. The first twelve numbers

TABLE I.

1	2	3	4	5	6	7	6	5	4	3	2
1	1	2	3	4	5	6	7	6	5	4	3
2	1	1	2	3	4	5	6	7	6	5	4
4	4	6	9	12	15	18	19	18	15	12	9
3	2	1	1	2	3	4	5	6	7	6	5
4	3	2	1	1	2	3	4	5	6	7	6
5	4	3	2	1	1	2	3	4	5	6	7
12	9	6	4	4	6	9	12	15	18	19	18

are written in series, the next twelve beneath these, and the third twelve in sequence beneath the latter row. The columns are then summed. The twelve terms succeeding the last are now written down and the same process applied. If the sums are considered, it is noticed that in the first series the maximum number, 19, occurs eighth from the beginning of the row of sums. In the second summation it occurs three places further on. Had twelve terms been the true period, the maximum would have appeared in each successive series of sums at exactly the same place. From the

figures thus obtained, however, an approximation to the real period can be calculated by considering how far the maximum has moved backwards or forwards in the succeeding series of sums. If the maximum moves forwards, the period tried is too short, while if it moves backwards, the period tried is too long. By taking the number of rows in each successive sum and the number of units the maximum moves forwards or backwards, a correction can be made of the trial period. The amount of movement of the maximum is divided by the number of rows in each sum and added or subtracted from the trial period in accordance with the rule given. In this case the maximum has moved forward three units, and with three rows in each sum it is evident that the period is approximately one unit too short. As is known already, this is the case. In general the maxima are not so definitely apparent as in this example, but the principle of application is exactly the same.

Sub-periods are found in the same way. If in any trial period the sums be taken out of time with any real period, the variations of the latter period tend to cancel each other. If there be a combination of periods and the trial period be approximately true, the variations of the period sought tend to become exaggerated. In Table II, a simple example of this is given. If we take the period 1, 2, 3, 4, 5, 4, 3, 2, 1, and place below it a sub-period 1, 2, 1, etc., we obtain by adding, a series showing some irregularity. If this is added up in rows of

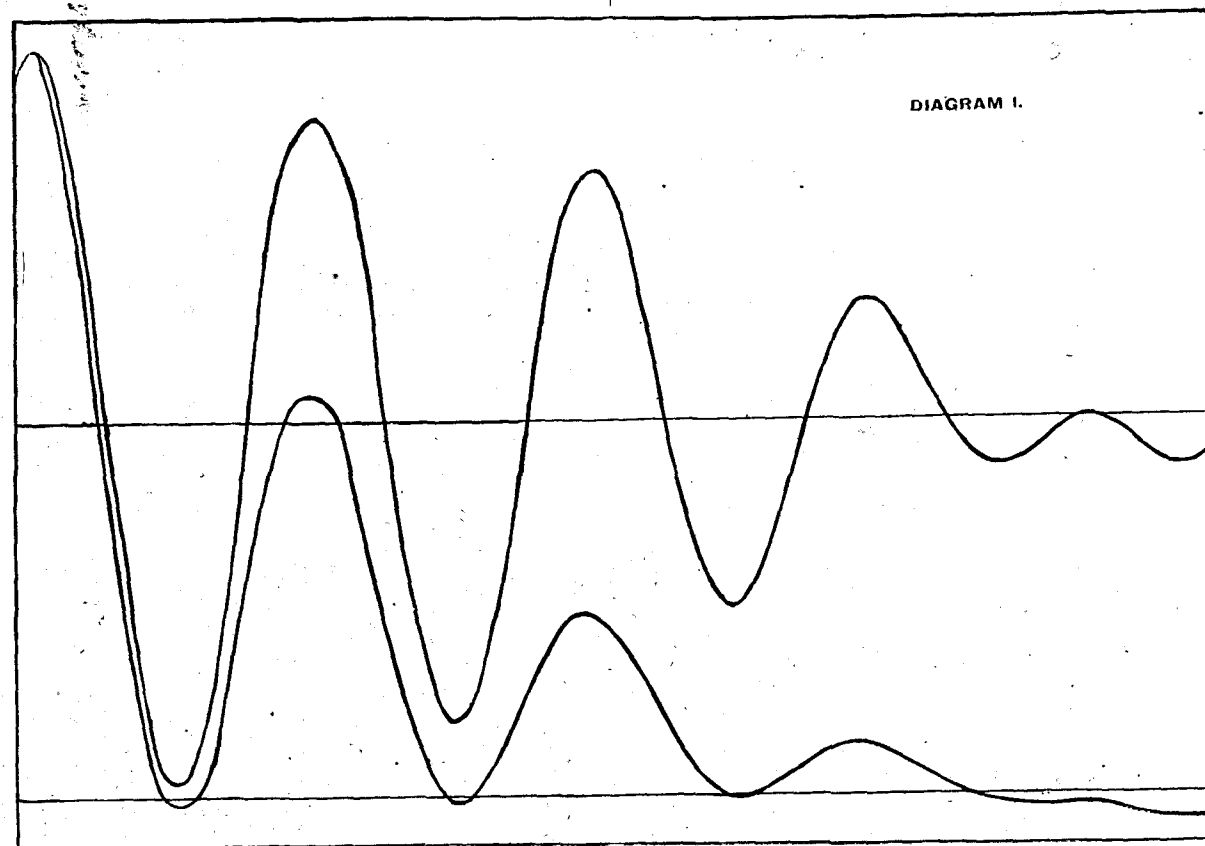
TABLE II.

1	2	3	4	5	4	3	2	1
1	2	1	1	2	1	1	2	1
2	4	4	5	7	5	4	4	2
2	4	4			1	2	3	
5	7	5			4	5	4	
4	4	2			3	2	1	
11	15	11			8	9	8	

threes the effect of the long period is nearly eliminated and the existence of the short period made at once evident. For comparison the original period is shown added up in a series of threes showing almost no variation. The application of this method is comparatively simple if long series of statistics are available. An approximate period once found, it is easy to determine the true period

with considerable exactness. It is often, however, only with a good deal of work and with the trial of many periods of consecutively increasing size that a true period is found.

In epidemic disease there is another source of difficulty. A series of epidemics year after year of a disease such as measles does not immediately reveal the true periodicity, since the season of the year has an undoubted influence in the development of the epidemic. When the periodicity due to the organism is brought into conflict with that due to the season the course of the prevalence shows the phenomenon of "interference." This is well known to musicians.



If two strings of nearly equal pitch, but not quite in tune, are vibrating, the note in place of being of uniform volume varies in intensity. These variations in intensity are known by the name of "beats." At one instant the two strings are vibrating in the same direction and give a full note; later, owing to the slight differences of the periods of vibration, they are vibrating in opposite directions and the one string more or less annuls the effect of the other. This phenomenon is common in epidemic disease. In the accompanying diagram (diagram I.) is shown a curve of interference. It will be noticed that to a period of exaggerated waves

a period of almost uniform level follows. This is succeeded again by the same exaggerated waves. The same phenomenon is seen in diagram II.,* which represents the epidemics of whooping-cough in Sweden in the eighteenth century, and the same kind of phenomenon, though not so obviously marked, is seen in the epidemics of whooping-cough in London during the past century. Wherever there is a seasonal prevalence of a disease, and the cycle in the life history of the organism is of a different period from that of the solar year, such curves are bound to arise if one period of the year is more suitable than another to the activity of

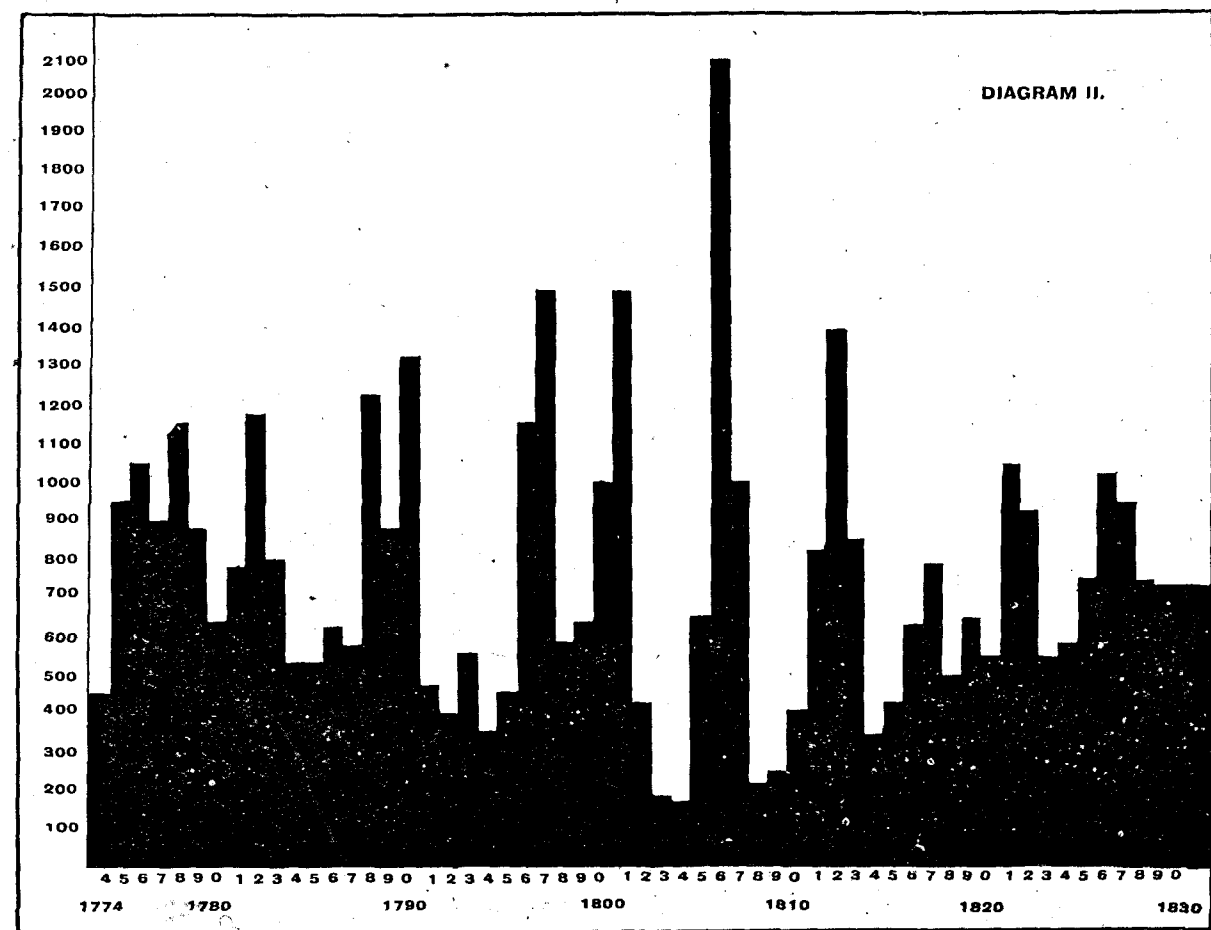
the organism. These curves will be further illustrated later in this paper.

To begin more particularly with measles, it is well known that this disease has two maxima in the year. Epidemics occur, both in the early winter and in the early summer, in some places more intensely at the one season than at the other. In London, for instance, in the fifty years 1848-1897, the average proportions of deaths per thousand deaths occurring during the year in each of the thirteen periods of four weeks are given by the following figures:—83, 57, 76, 87, 96, 99, 90, 76, 54, 38, 57, 87, 103.

* Taken from Ransom's article on Vital Statistics in Stephenson and Murphy's Text Book of Hygiene.

In this case in addition to the seasonal periodicity just shown, a well-marked periodicity of one and seven-eighth years in the life history of the organism has been ascertained to exist. This periodicity is shown in diagram III. (p. 128) Here we have the results of summing the number of deaths from measles in each eighth of a year from 1840 to 1912 in rows of fifteen terms. As 30 years constitute a complete cycle the table has been summed in three sections, namely, two complete cycles and one part cycle. These three sums are shown in the diagram. It will be noticed that the maxima

time. If in place of examining the diagram the actual figures upon which the diagram is based are considered it will be noticed that, as the line of the maximum of the successive epidemics is followed, the maximum alternately increases and diminishes. In Table III. these numbers are gathered together in groups of four, so that it can be seen that as regards the number of cases occurring at the maximum point there is a well marked four-period cycle, which as the period is one and seven-eighth years, means a cycle of seven years and a half. This is obviously due to the interference of the



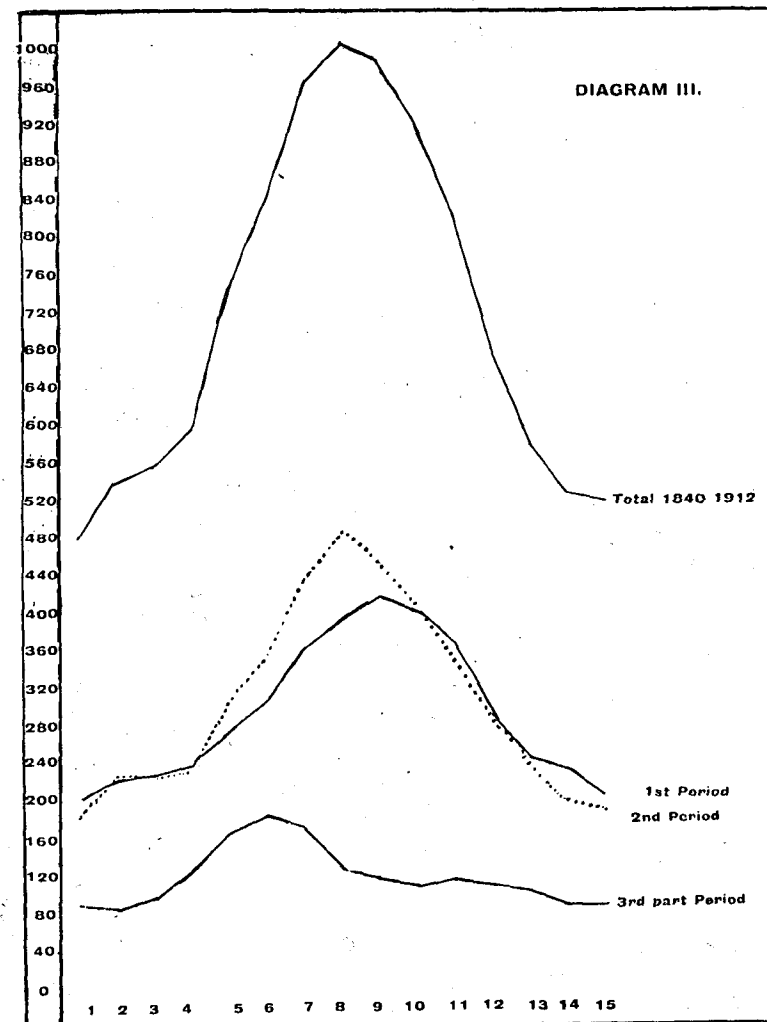
of the first two sections differ by one division, the movement of the maximum being backwards. One division corresponds to an eighth of a year. The average period is thus for these 60 years three days less than one and seven-eighth years. In the part period below, the maximum has moved back two further divisions, but in the last few years the evidence is all to show that the maximum as the period progresses will come nearly in line with those shown above. In any case, as will be seen, some small variation backwards or forwards occurs from time to

period of the life history of the organism with the bi-yearly seasonal epidemic.

The figures on which the diagram given to show the periodicity of measles in London is based are those obtained from quarter years. Unfortunately such detail is not always available, and we are thrown back on annual figures. Even with these, however, the periodicities can be discovered, though much more labour is required to find them. A period once found, however, from given statistics, can be followed into annual statistics. As an example of the

method the periodicity of measles in London from 1840 to 1869 is shown in Table IV. Here the death-rate for measles for each year has been assumed to be constant throughout that year, so that each eighth of each year is represented by the same figure. In rows of fifteen divisions these figures are written beneath one another in series and the results summed. The periodicity is quite evident, but the range between the maximum and the minimum is much less than that found when

eighteenth century, and they cannot be taken at quite the same value, as at that time measles was not separately diagnosed from scarlet fever. From 1710 onwards till 1829, however, there is a series of figures relating to the annual number of deaths, and these have been reduced in sections of fifteen years. With the matter of one gap between 1830 and 1845 the record is complete from 1710 to the present day. The period of one and seven-eighth years is well marked during the whole of this time as



the quarter year periods are taken. As the basis of comparison the sums of columns have been reduced to units per thousand. In the example given here the maximum found by the above assumption is only about one and a half times the minimum, while in the figures reduced by quarter years the maximum is rather more than twice the minimum.

This process has been applied to the whole figures of measles in London from 1620 to the present day. Few figures exist before the

will be seen on reference to Table V. It is a curious fact that apparently there is some interference phenomenon at work in addition, as every alternate period from 1710 on till 1820 shows the absence of evidence of the same definite periodicity. When the first, third, fifth and seventh periods denoted by R are summed, the maximum is twice the minimum, but when the second, fourth, sixth and eighth periods denoted by A. R. are summed, the maximum is only one and one-third times the minimum and is half a

year later. This interference no longer seems to exist as will be seen when the figures for the periods from 1845 are examined. In this table the maximum is indicated by the capital letter M placed above each row and the minimum by a small m. These have swung slightly backwards and forwards, but they remain stationary on the whole, so that the average periodicity of the organism as seen in London must be taken at one and seven-eighth years. When the figures of the seventeenth century are examined there are indications still of this periodicity, but the records of the number of deaths suggest incomplete returns, and the sums of the columns are so much affected by certain large epidemics that not too much stress can be placed on the result.

An additional example, that of Perth, is given in the Table VI. In this case a short periodicity, namely sixteen months, is found. The epidemics occur with very well-marked regularity, there being only two aberrant epidemics. These are indicated in the table by italics and are summed separately. Even when they are included, however, the periodicity is nearly as well marked. As an example of how easily a period such as this may be missed, the sums of the numbers of deaths are given for a fifteen months' period, and also for one of seventeen months. It will be observed how much less evidence of periodicity these sums show in comparison with that of the sums of the sixteen months period. In addition to the table given for Perth, one (Table VII.) is given for fourteen years in Paisley from 1855 to 1868. In this town the two-yearly periodicity is quite evident. Those desirous of further information with regard to measles will find full tables for Aberdeen, Dundee, Glasgow and London in a former paper.* The periods there shown vary from fifteen and a half months in Glasgow 1773-1800, to three years as seen in Dundee 1855-1875.

With regard to whooping-cough in London exactly the same phenomena are observed. The maximum seasonal prevalence of whooping-cough is in the early months of the year. The organism is found, however, to have a periodicity of one and fourteen-fifteenths of a year, the maximum ordinate of the periodicity curve being nearly twice as great as that of the minimum. This gives rise to a complicated interference curve, which may be most

* "Periodicity in Infectious Disease." *Proc. Roy. Phil. Soc., Glasgow*, 1914.

easily studied by summing the deaths from whooping-cough for each lunar month for periods of five successive two-yearly periods. The series of sums are shown in Table VIII. The vertical line in the middle of the table divides the sums, so that on the one side the deaths in each lunar month are summed for the years 1840, 42, 44, 46, 48, and on the other for the years 1841, 43, 45, 47, 49, and so on. It will be observed that from 1840 to 1869 the maximum winter and spring epidemic is in the right hand side of the table, *i.e.*, in the odd years. From 1870-1899 the maximum has changed to the left or to the even years, and with 1900 a return is made to the former condition. This is explainable by the interference between a seasonal prevalence and a periodicity in the life history of the organism of one and fourteen-fifteenths years. The full figures showing the period are given in my former paper (*loc. cit.*).

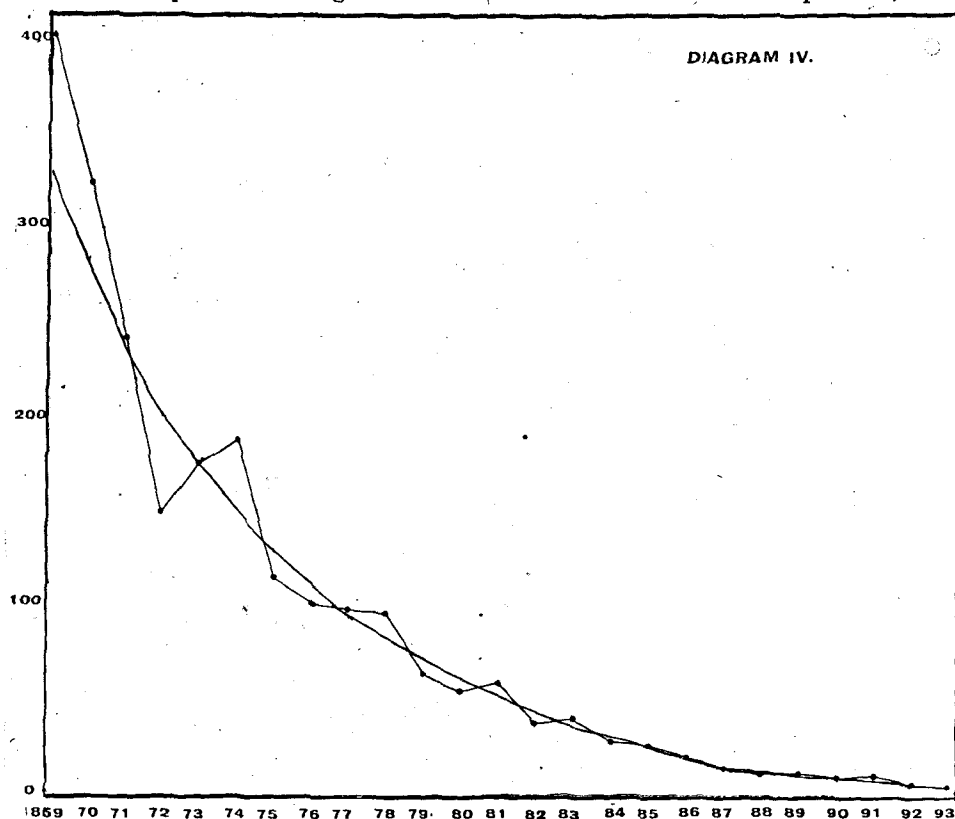
The same kinds of periodicity are also found in smallpox. In London during the whole of the eighteenth century a periodicity of almost one and seven-eighth years persisted. This is the same as measles and the coincidence is suggestive. It is made the more suggestive when it is noted that during the latter years of the eighteenth century, in Glasgow, a periodicity of fifteen and a half months is found to have existed for measles, and from 1855 onwards a like period existed for smallpox. A table of the latter (Table IX.) is given in this place. From 1773 to 1812 the periodicity of smallpox in Glasgow was, however, one and three-quarter years.

Short waves such as have been considered are comparatively easy to find out. Long waves on the other hand are much more difficult to study. There is seldom any sufficient length of statistics to enable these to be properly investigated. With regard to diphtheria the waves seem to be nine or ten years in length. In the statistics of Sweden for the eighteenth century the period seven and a quarter years is easily found for measles. This period is so close to the secondary seven and a half years period found in English statistics that it is possibly due to the awakening of the measles organism to activity at some specially favourable season of the year, the burst of activity resulting from interference between the organism and the solar year. The data for Sweden, however, are only annual data, and, as is remarked before, the annual data do not lend themselves so easily to certain investigation. In scarlet fever also periods of some

length seem to occur. In the experience of Liverpool these periods are almost exactly four years. In London nearly five years; in the Swedish statistics of the eighteenth century five years and one-third, and in other towns periods varying between these limits, but the waves of scarlet fever are much more complex than those of measles, smallpox and whooping-cough. There is almost certainly some other factor present which I have not succeeded in analysing.

The curves of malaria must also be complex, because in this case we have three definite factors, the season of the year, the plasmodium of malaria and the mosquito. A long series of

some remarks must be made. Some diseases seem to come in long waves at long intervals of time. Plague is one of these diseases. Without any apparent reason the disease dies away and disappears for years. Typhus is another of these diseases. I think that the disappearance of typhus was as much due to natural causes as to sanitary endeavour. It is difficult to offer proof of either statement. According to the theories of epidemiology I have elsewhere developed, the end of an epidemic should be approximately represented by a simple geometrical progression, that is to say, that if there be at one time a certain amount of a disease present, and if after a



figures about malaria would thus be specially interesting. The only such line of figures I have had access to are the annual deaths from ague in London from 1705 to 1820. These show a quite definite periodicity of nine and a half years, a number independent apparently of the solar year. The figures are given in the annexed table (Table X.) As one of these epidemics is much larger than any of the others, and as it might be presumed that this determined an appearance of periodicity which was not otherwise justified, that particular row has been subtracted from the total to show that the periodicity remains very well marked.

There is, however, another feature on which

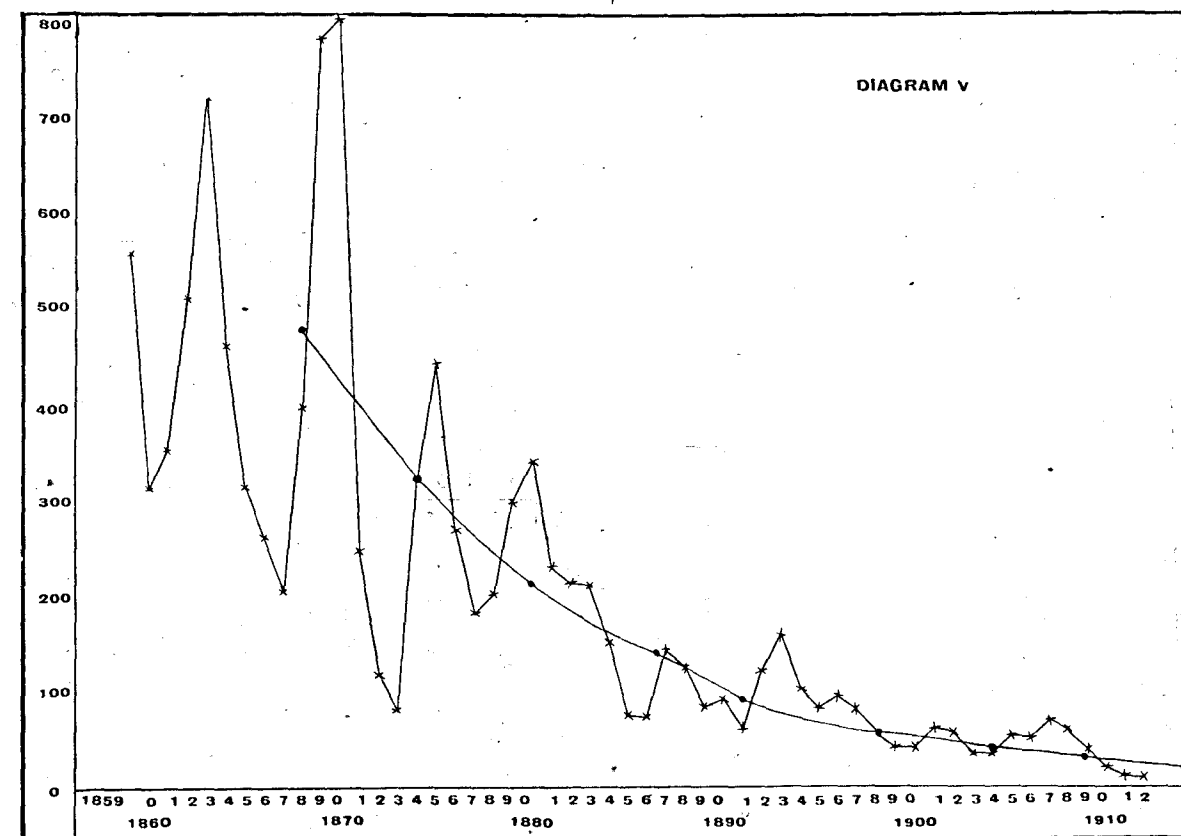
certain portion of time there is half as much present, then after another equal portion of time there will be only a quarter. This is what is found in typhus fever. In the accompanying diagram the disappearance of typhus fever in England is fitted to such a curve. It will be noticed how closely the curve passes through the means of the three to four-yearly variations of the prevalence of the disease. It might of course be urged that, as sanitary appliances are brought to bear on a less and less prevalence, the diminution might result in the same degree from man's endeavour, but the fact that the disease disappeared from the West Highlands and from the west of

Ireland at the same time as it died out in England, suggests that some change in the organism was at least of as much importance as the application of sanitary measures.

There is, however, another method by which a disease can disappear from the death registers without the disease itself disappearing. Scarlet fever is an example of this. I can find no evidence that the amount of scarlet fever at the present day is much less than it was in the

noticed that the irregular curve of the epidemic waves swings very evenly above and below the curve of the geometrical progression. It would seem as if the virulence of the organism, which must be distinguished from its infectivity has declined according to the same law which has been found to apply to the decline of the infectivity of the organism of typhus.

The diagram, however, illustrates another point. If the peak in 1875 is taken as the



latter half of last century. The epidemics in London and Glasgow during the time notification has been in force have been of much the same size, though the mortality has much declined. In the accompanying diagram (Diagram V.) the mortality from scarlet fever in London per ten thousand persons living under ten years of age is shown. A geometrical progression has been fitted to the portion from 1868 onwards, and it will be

starting point, it may be noticed that it is followed by a lower but broader epidemic wave culminating in 1880. The same phenomenon is repeated on a lower level beginning in 1887, and again beginning in 1901. There is thus a complex fourteen-year cycle in the epidemic wave. I have not succeeded up to the present in making a satisfactory analysis of this. There is some evidence, however, that the main period is four and two-thirds years.

TABLE III.—Showing the Number of Deaths from Measles at the Maximum Periods of the successive epidemics for Seventy Years, Arranged in Sets of Four Periods. London.

10	20	23	34
26	18	25	9
16	19	26	29
32	42	41	23
17	38	71	17
22	42	45	24
24	32	74	47
29	87	81	75
30	27	19	13
Total	206	325	405

TABLE IV.—Showing how the One and Seven-Eighth Period of a Year May be Obtained From the Annual Figures, Years 1840-1869. London.

	53	53	53	53	53	53	53	53	44	44	44	44	44	44	44
	44	56	56	56	56	56	56	56	56	61	61	61	61	61	61
	61	61	49	49	49	49	49	49	49	49	92	92	92	92	92
	92	92	92	29	29	29	29	29	29	29	29	67	67	67	67
	67	67	67	42	42	42	42	42	42	42	42	42	41	41	41
	41	41	41	41	41	34	34	34	34	34	34	34	34	45	45
	45	45	45	45	45	45	20	20	20	20	20	20	20	20	33
	33	33	33	33	33	33	33	44	44	44	44	44	44	44	44
	27	27	27	27	27	27	27	27	44	44	44	44	44	44	44
	44	42	42	42	42	42	42	42	70	70	70	70	70	70	70
	70	70	37	37	37	37	37	37	37	37	58	58	58	58	58
	58	58	58	30	30	30	30	30	30	30	30	62	62	62	62
	62	62	62	62	45	45	45	45	45	45	45	45	72	72	72
	72	72	72	72	72	34	34	34	34	34	34	34	34	58	58
	58	58	58	58	58	58	28	28	28	28	28	28	28	28	49
	49	49	49	49	49	49	49	35	35	35	35	35	35	35	35
Total	876	886	841	745	708	663	608	605	613	646	710	780	806	841	875
Total Reduced to 1,000	78	79	75	66	63	51	51	54	55	58	63	70	72	75	78
Total Quarter Years Reduced to 1,000 ..	90	95	92	78	64	56	54	51	47	51	52	54	62	70	83

TABLE V.—Showing the Periodicity of Measles in One and Seven-Eighth Year Periods, from 1620 to the Present Day, as explained in text. London.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R. 1620-1634	81	72	72	72	89	89	56	56	56	56	56	56	56	56	74
A.R. 1635-1649							No	Statistics.							
R. 1650-1664	39	41	47	63	71	79	59	90	90	84	79	63	55	68	71
A.R. 1665-1679	101	106	90	75	70	23	23	25	25	32	50	57	106	108	108
R. 1680-1694							No	Statistics.							
A.R. 1695-1709							M							m	
R. 1710-1724	55	54	58	70	92	91	84	79	75	71	69	57	45	46	52
A.R. 1725-1739	59	50	48	37	66	66	64	69	79	79	93	90	60	68	73
R. 1740-1754	32	84	83	97	93	105	110	97	96	42	37	34	39	22	30
A.R. 1755-1769	77	73	62	68	83	83	70	61	53	73	69	60	44	57	67
R. 1770-1784	67	71	68	62	72	80	78	71	63	62	69	69	57	54	56
A.R. 1785-1799	69	47	61	60	54	59	56	57	81	80	70	79	76	76	75
R. 1800-1814	43	50	52	52	67	81	84	88	84	82	81	79	60	48	50
A.R. 1815-1829	74	70	70	68	66	63	62	59	63	63	64	66	70	70	73
1830-1844					M		No	Statistics.					M		
1845-1859	70	77	77	79	82	79	78	72	60	55	54	49	52	55	60
1860-1874	59	67	70	74	78	78	79	77	71	71	61	56	53	53	55
1875-1889	57	61	64	68	68	71	74	74	75	70	66	66	65	62	60
1890-1904	58	63	69	72	76	75	77	78	73	67	65	59	56	56	55
Average—						M								m	
R. 1710-1840	49	65	65	70	81	89	89	84	79	65	64	60	50	43	47
A.R. 1710-1840	70	55	60	58	67	68	63	62	69	79	79	79	62	68	72
1845-1904	61	67	70	73	76	76	77	75	70	66	62	58	57	57	58

TABLE VI.—Showing the Number of Deaths in each Month from Measles in Perth,
July, 1871—September, 1911.
Added in Columns to Show the Sixteenth Month Periodicity.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
				1								2				
		1										1	3	3	6	2
					1	1	3	1	1							
					2	2	2			5	5	3	2	2		
					1	1										
	1														4	8
	12	1	1						1					1	2	
	1															3
	8				1											
			1	1												
	4	4	1	5	4	4	2	1								
	3	6	6		1											
	2	1								2	5	4	7			
		1												1		3
	2	6	3			1	1									3
	2															
		2			1											
			6	7	5								1		1	
	2		1			1										4
		1	1	1					1						2	
	1				1			1	1	1	2		1			
Total	38	23	20	15	17	8	8	6	4	17	57	37	53	52	15	23
Totals 15 Months ..	38	23	20	15	17	8	8	6	4	8	12	10	8	7	15	23
Totals 17 Months ..	17	18	16	8	7	9	17	17	6	10	21	27	13	14	14	
Totals 17 Months ..	4	8	13	16	16	15	12	16	15	19	16	15	16	12	12	7

TABLE VII.—Showing the Quarterly Number of Deaths from Measles in Paisley, 1856-1869,
in Two Yearly Periods.

9	7	7	18	8	11	17	22
8	—	1	6	4	6	9	6
8	8	10	9	22	14	5	5
—	1	4	10	34	12	1	1
—	2	2	17	35	23	8	1
2	—	2	31	20	4	1	1
1	—	3	3	10	12	3	—
Total 28	18	29	94	133	82	44	36

TABLE VIII.—Showing the Number of Deaths from Whooping Cough in London, 1840-1909, Summed for each Ten Years in Lunar Months, as explained in the text.

	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	1
1840-49	83	81	78	81	68	56	47	43	30	41	41	49	71	82	94	102	92	.88	77	71	59	50	59	62	72	8
1850-59	98	100	107	109	98	90	77	58	46	48	52	70	87	108	125	132	122	107	96	80	68	53	43	50	69	8
1860-69	122	120	130	125	143	103	74	78	55	48	56	73	94	140	142	147	161	137	126	101	88	78	71	75	80	140
1870-79	157	178	165	182	142	153	95	88	61	58	45	60	79	93	118	92	134	125	97	81	81	77	69	66	85	110
1880-89	217	302	245	233	183	120	96	78	55	40	32	34	47	68	73	75	87	90	85	95	83	64	55	58	87	140
1890-99	190	161	151	155	148	113	83	75	54	41	31	33	51	77	85	106	105	96	76	72	68	63	58	44	63	117
1900-09	58	79	79	93	78	65	55	42	37	40	26	28	46	70	83	89	100	94	71	50	43	42	32	25	25	11

TABLE IX.—Showing the Number of Deaths from Smallpox in Glasgow per Month, 1856-1872, Arranged to Show the Periodicity of 15½ Months.

6	6	9	9	2	7	4	4	7	7	11	11	10	10	11	11	14	14	17	17	6	6	9	8	8	8	8	11	11	9	
9	15	15	18	18	24	24	30	30	27	27	31	31	58	58	55	55	52	52	36	36	34	34	18	18	22	22	19	13	13	
20	20	13	13	9	9	4	4	3	3	7	7	7	7	10	10	3	3	7	7	5	5	9	9	6	6	3	3	7	9	
9	9	9	19	19	18	18	24	24	32	32	59	59	79	79	57	57	54	54	42	42	25	25	22	22	12	12	12	11	11	
9	9	8	8	13	13	22	22	16	16	25	25	10	10	7	7	14	14	10	10	9	9	—	—	8	8	5	5	5	5	
5	3	3	3	3	3	3	1	1	3	3	1	1	1	1	—	—	3	3	3	3	4	4	5	5	3	3	10	10	—	
12	12	14	14	18	18	34	34	43	43	62	62	74	74	76	76	51	51	59	59	44	44	35	35	27	27	23	23	16	8	
8	21	21	9	9	3	3	6	6	6	—	—	1	1	2	2	—	—	1	1	4	4	1	1	2	2	1	1	3	3	
3	3	3	3	2	2	4	4	9	9	13	13	18	18	10	10	10	10	12	12	8	8	6	6	6	6	7	7	6	7	
81	98	95	96	93	97	116	129	139	146	186	209	210	258	253	228	206	201	214	187	154	139	126	105	101	94	85	88	87	72	65

TABLE X.—Showing the Number of Deaths from Ague, London 1705-1808, Arranged and Summed to Show the Nine and a-Half Years' Periods.

	3	3	2	2	2	2	4	4	15	15	10	10	1	1	8	8	11	11	4
	4	8	8	2	2	4	4	10	10	15	15	15	15	13	18	9	9	5	5
	4	4	3	3	6	6	11	11	44	44	27	27	16	16	11	11	10	10	3
	3	6	6	6	6	1	3	3	8	8	9	9	3	6	6	3	3	8	8
	5	5	6	6	6	15	15	15	8	8	9	15	15	11	11	7	7	2	2
	2	4	4	4	4	5	5	6	6	4	4	1	1	2	2	9	9	12	12
	8	8	10	10	8	8	7	7	15	15	18	18	5	5	2	2	8	8	1
	1	2	2	5	5	9	9	5	5	6	6	2	2	5	5	4	4	9	9
	9	9	5	5	11	11	8	8	8	8	6	6	6	6	7	7	4	4	3
	3	1	1	6	6	5	5	4	4	10	10	6	6	5	5	8	8	3	3
	2	2	4	4	2	2	1	1	2	2	3	3	13	13	1	1	5	5	4
	4	5	5	1	1	2	2	2	2	2	2	5	5	3	3	2	2	1	1
Total..	48	57	56	54	59	61	72	75	122	130	111	105	88	95	79	75	80	83	55
	4	4	3	3	6	6	11	11	44	44	27	27	16	16	11	11	10	10	3
Total—less year of large epidemic ..	44	53	53	51	53	55	61	65	78	86	84	78	72	79	68	64	70	73	52

APPOINTMENTS.

DR. WILLIAM BATES, of Wednesfield, has been appointed assistant county medical officer of health of Warwickshire.

DR. CLIFFORD BEARDS has been appointed medical officer of health for the East Wilts. combined sanitary district, and assistant school medical officer to the Wilts. Education Committee.

DR. AGNES BERNFELD, of Bolton, has been appointed assistant medical officer of health of the county borough of Burton-on-Trent.

DR. H. B. GIBBINS has been appointed medical officer of the Tuberculosis Dispensary established at St. Bartholomew's Hospital in connection with the National Insurance Act.

DR. E. R. S. HALE has been appointed medical officer of health of the borough of Ossett, during the absence of Dr. Wood on active service.

DR. W. R. HONEYBURN, school medical inspector of the North Riding of Yorkshire, has been appointed assistant medical officer of health of the city of Chester.

DR. GEO. KENDALL has been appointed temporary medical officer of health of Battle U.D. during the absence of Dr. D. Brough, who has joined the R.A.M.C.

DR. A. R. M'ILRAITH, of Beverley, has been appointed temporary assistant medical officer of health of the borough of Warrington, during the absence of Dr. Lumb on active service.

DR. R. GALWAY MURRAY has been appointed locum tenens for Dr. Dudfield, medical officer of health of Paddington, during the latter's absence on military service.

DR. C. E. SALTER has been appointed temporary substitute to perform the duties of assistant medical officer of health and assistant school medical officer of the borough of Scarborough during the absence of Dr. Tatham.

DR. BASIL WALLIS has been appointed medical officer of health of the borough of Helston, subject to the sanction of the Local Government Board.

MILITARY APPOINTMENTS.

DR. B. L. T. BARNETT, medical officer of health, and school medical officer of the administrative county of the Isle of Ely, appointed a Captain in the Army Service Corps.

DR. C. A. BIGNOLD, assistant medical officer of health of the county of Ayr, now Captain R.A.M.C. (S.R.)

DR. J. H. CROCKER, medical officer of health, Richmond, Surrey, Captain R.A.M.C. (Ter. S.S.), has been appointed Honorary Physician and Registrar to the Red Cross Hospital, Richmond—overflow to the 2nd London (City of London) General Hospital, Chelsea.

DR. R. A. DUNN, medical officer of health of the combined district of East Herts. and Essex, is serving in the R.A.M.C., and has received a commission as Captain.

DR. A. E. L. WEAR, chief school medical officer of Leeds, now Lieut.-Col. R.A.M.C., head of a clearing hospital in France.

DR. W. L. R. WOOD, medical officer of health of borough of Ossett, has been "called up" for military service.

HOW CIVIL HEALTH OFFICERS CAN GIVE ASSISTANCE TO THE MILITARY AUTHORITIES IN TIME OF MOBILISATION OR OF WAR.

By G. SIMS WOODHEAD, M.D., LL.D.

Lieut.-Col. R.A.M.C., T.F., S.S., Fellow of Trinity Hall, and Professor of Pathology, University of Cambridge.

BEING asked to offer some suggestions as to how the medical officers of health of the country could best co-operate with the military sanitary authorities, I responded to the invitation with all the alacrity that is born of incomplete knowledge and a fairly extensive inexperience. I now know that had the invitation been deferred to the present I should not have been nearly so ready to open the discussion, though I should still have very great pleasure in taking part in it, but at a later stage, as within the last few months, I have had, as have most of us, an opportunity of testing theory and hypothesis by experience, and of seeing in actual practice what an advantage it is to the military authorities that they have, in different parts of the country, the benefit of the knowledge, advice, and co-operation of a most efficient body of medical officers of health.

The Local Government Board, the guardian of the public health, knowing the value of the experience of its medical officers, early recognised that the help of these men might be of enormous value to the military authorities, and soon after the outbreak of the war sent out a series of circulars to both sanitary bodies, military and civil, inviting the confidence of one and placing the services of the other at the disposal of the military authorities. The suggestions made in these circulars were undoubtedly valuable as indicating what might be done and how the two services might work together to their mutual advantage, but, owing to the different circumstances existing and the varied conditions met with in different areas, it was obviously impossible for them to lay down any hard and fast lines of co-operation or advise how best such co-operation was to be obtained.

I may have been singularly fortunate in the men with whom I have had to work; indeed, I am satisfied that such is the case; but, so far as my experience goes, there need be, as a rule, little or no friction between the civil and military sanitary authorities. To ensure this the exercise of tact on both sides may be necessary, and some allowance for differences in method and for the bearing of individuality

on the working out of problems; but with these the chief factors essential for the smooth working of the civil and military health authorities side by side are the following:—

- (1.) A free interchange of information and ideas; this can only be effected when there is a readiness to help.
- (2.) Avoidance of bones of contention; this can only be done by a willingness to delimit spheres of operations as far as possible, but by accepting, without cavil or mistrust, slight invasions of these spheres;
- (3.) Subjection of official interests to the common welfare and general convenience; and
- (4.) Mutual trust and forbearance.

These sound almost as trite as copybook headings, and when health is good, things are going well, and worry and overwork are not prominent factors, work, as a rule, runs smoothly enough; but, lacking these, agreement and co-operation are not always so easy as might appear at first sight. Let me give our experience in Cambridge as an example of what may go on in a small town of about 60,000 inhabitants. Even under normal conditions the medical officer of health has to cope with problems difficult enough to try both ingenuity and temper; his drainage schemes go wrong, the health of the children in the schools is not satisfactory, small epidemics of infective disease make their appearance, insanitary areas are brought under his notice, and under ordinary conditions and in normal times he devotes much of his spare time and energy to a consideration of the best means of improving these areas, of disposing of sewage, of improving the ventilation of his lodging-houses, of obtaining, from a sometimes unwilling health committee or corporation, additional isolation accommodation, an extra inspector, and the like. His is not a bed of roses by any means or at any time. What, then, must his feelings be when it is announced that within a few days there will be an addition of 20,000 men and 2,000 or 3,000 horses to his community? His scavenging resources are already severely taxed, how is he to make arrangements to deal effectively with the camp refuse and waste material, excreta, etc., of such a greatly increased population? Even when these troops and horses are put into camps pitched on commons and fields, and their sanitary arrangements are those of the route march or of a standing camp, and are

looked after by the camp orderly, the conditions are usually such that they must receive the constant attention of the civil medical officer of health. As sanitary adviser working in a district in which all this has occurred, I have had experience of such difficulties, and I have seen what heavy and constant claim meeting them has made on the time, energy, and patience of the medical officer of health; but throughout it all I have invariably received from the medical officers of health, both town and administrative county, invaluable help and unvarying courtesy, and I can vouch for it that all the sanitary officials, whether of the Regular Army, Kitchener's recruits, or Territorial forces, service battalions or reserves, have had a similar experience.

Turning to details, it is obvious that the medical officer of health can exert little or no control over meat supplies, or food supplies of any kind. The mere inspection of rations must, under the conditions described, be left entirely to the company officers and to the members of the Royal Army Medical Corps. With the water supply, however, it is often essential that he should concern himself much more closely. Where the camping ground is well away from the water-bearing areas, and especially when it is situated at a lower level, he is tempted to do anything but ask that sentries may be detached to guard the reservoir, wells, or springs from which the water is derived. In some cases, as where troops pass over or encamp on water-bearing or water-collecting areas, he may feel called upon to requisition guards for the protection of these areas, though from my experience—in one or two areas especially—I am satisfied that a small civil guard of the company's servants is usually to be preferred to a military patrol, and this for obvious reasons. Men on sentry duty must be relieved at regular intervals, and the guard changed every day. From five or six to fifty men for each twenty-four hours may have to be detailed for this duty, and, although instructions are supposed to be passed on from guard to guard, the men, not being of equal intelligence, a certain proportion of them invariably fail to grasp them; they do not understand their mere duties, and fail to appreciate the importance of some of the detailed instructions they receive. On one water-bearing area where springheads are surrounded by unclimbable protecting fences it was found that the soldiers were using the huts erected to protect the springheads as

sleeping-places, and were converting the ground within the enclosure into a diffuse latrine, with the result that the medical officer of health had to ask that the whole of the guards should be withdrawn, and that the water company should put its own servants on patrol duty in the water-bearing area. Here the local knowledge and the experience of the medical officer of health were invaluable. He could give information not otherwise available to the military sanitary authorities, and take steps that could not have been foreseen to be necessary, and to him it was left to point out that unobtrusive patrol by the company's servants was not only more efficient, but must attract less attention than did the military patrol.

It is only on such occasions as the present war that it is realised how far-reaching and accurate is the knowledge gathered during a number of years' official service by the medical officer of health. The military authorities, although nominally applying to the police for information concerning open spaces in which camps may be erected, are to a very large extent dependent upon information that can be supplied to them by the medical officer of health, and by him only. He alone, as a rule, can put them in possession of information as to whether a site is dustless in summer, dry or damp in winter. He, better than the police, can keep them posted on the places to be avoided. He has a knowledge of the character of the population in different parts of his beat, of the localities in which undesirables of both sexes congregate and are concentrated, of the type and efficiency of the sewage and drainage of an area, the character of the soil, and the facilities for obtaining water and for the disposal of camp refuse. In the interests of the inhabitants it is important that he should advise as to camping areas, in order to prevent overcrowding of any special district, and that he should be able to indicate any difficulties connected with full inspection, the nature of the soil and sub-soil, especially as bearing on the disposal of sewage on or below the surface, and in relation to the water-bearing strata. As an instance of the advantage of local knowledge in matters of this kind, I may point out that in a district where the river is bounded by clay banks it might be perfectly safe to excavate latrines fairly close to the river, but that latrines excavated from the gravel into which the water from the river percolates as soon as the excavations are made must be far from satisfactory.

It is obvious that as the military authorities are in command where troops are encamped, much of the responsibility for preliminary arrangements and even for the carrying out of detail must be left to the officers of the Royal Engineers and of the Royal Army Medical Corps, but it is equally obvious that at no point should they allow themselves to get out of touch with the civil medical officer of health. They, as military sanitary authorities holding temporary office in the camping area, can know little or nothing of the prevalence of epidemics or of any special features in the health of the town. They are, indeed, entirely dependent upon the medical officer of health for information that is vital to the success of their efforts to keep the troops healthy, and, finally they must, in many cases, rely upon the medical officer for accommodation of their fever patients in the isolation hospital, for in most places such hospital is the only institution or building into which infective cases from amongst the troops can be received.

In connection with this may I give an incident related to me by one of the participators. An A.D.M.S. was informed that there had been an epidemic outbreak in a recruiting camp. He made a special journey to this camp early in the morning, expecting to spend a long and arduous day in organising a special isolation hospital, collecting a staff of nurses and orderlies and making arrangements for the treatment of a considerable number of patients. "What was my surprise," he said, "to find that the young lieutenant of the R.A.M.C. had had the good sense to notify the cases by telephone to the civil medical officer of health, who had come at once to inspect the cases, had made his diagnosis and had accepted for treatment in his own isolation hospital three or four of the cases, two of them proving to be the disease that had been notified, whilst the others, recovering rapidly, were isolated until all chance of infection was over, and were then sent back to camp." The A.D.M.S., after inspecting the camp and conferring with the civil medical officer of health and the military sanitary officer, returned to headquarters with a perfectly easy mind.

In connection with duties that may be conflicting, one of the most difficult questions raised for consideration and settlement is that of payment for sanitary services of various kinds, and the allocation of the share of expense that should be met by municipal authorities as being incurred for the benefit of the town,

and the share that should be taken over by the military authorities as being for services carried out for the benefit of the troops. It may be accepted, of course, that the municipal authorities are responsible for all payments made on account of the preservation of the health of the permanent inhabitants of the town. It is contended by some, however, that the new population, although bringing in new dangers to the community, should be taken in hand by the corporation, and should be dealt with on the basis of its constituting a danger to the community; consequently it is maintained that the municipal authorities should be prepared to take, and pay for, all necessary precautions that have to be taken against that carriage of infection from sick troops to the inhabitants. On the other hand, it is recognised that the troops are engaged in national service, and that any expense to which the corporation is put in helping to preserve their health should be defrayed out of the national exchequer. Each treasury controller is naturally anxious to be relieved as much as possible, but surely there is some common principle on which an agreement may be arrived at. Take such a simple question as that of latrines, concerning which I have heard the whole matter argued out. The military authorities camping on a fine and very suitable common near a river which flows through the town after leaving the camp, cut large latrine trenches within a few feet of a slowly-flowing river; here the subsoil is extremely porous gravel, and water is reached at the level of the surface of the river. These latrines were not very carefully controlled, and the medical officer of health of the borough felt it incumbent on him to recommend the use of pail latrines and the filling in of the pit latrines. The military sanitary authorities, accustomed to the pit latrine, saw no need for the adoption of the pail system, but, in deference to the wishes of the medical officer of health, were willing to adopt it if the municipal authorities would provide the pails and arrange and pay for the removal of the contents and the cleansing of the pails. For 1,000 men this would not be a serious matter, but for 10,000, 15,000 or even more the question of expense assumes some importance. It is all no doubt a matter for discussion and adjustment between the two authorities, but it might be well that questions of general procedure should be settled at headquarters between, say the War Office and the Local Government Board, questions of details and questions arising out of local peculiarities

and conditions, and these only, being left to be settled on the spot. It is obvious that if general lines of procedure could be laid down at the centre, opportunities for much peripheral friction might be avoided.

In summer these camping questions occupy a first place, but in the winter months when most of the troops, both men and officers, not housed in hutments, are billeted on the inhabitants of many of our large towns, the medical officer of health has a much more prominent and important part to play in carrying out the arrangements necessary for the maintenance of the health and comfort of the troops. Here again he has knowledge possessed by no one else, and although, as already noted, the billeting officer and the chief of police ostensibly control the billeting arrangements, the information upon which they act is very largely supplied by the medical officer of health who, in the course of his work, has necessarily acquired a wide and varied knowledge concerning available accommodation, and of the ventilation, heating, lighting, and drainage of most of the public buildings. It is an easy matter for him to make a list of these, and in most instances to determine at once which of them can be spared comparatively easily, which cannot be spared so readily, and which of them, for reasons of public policy, should not be placed at the disposal of the billeting officer. With his sanitary inspectors' list of theatres, special buildings, day schools and Sunday schools, private billets, stables, sheds, and so on, before him, with their cubic capacity, their floor space and ventilation, their facilities for ablutions, bathing, and latrines, he is able, at very short notice, to place in the hands of the chief constable and the billeting officer a fairly complete statement as to the desirable accommodation available for troops. With the police history of a neighbourhood he may not always be conversant, but here again, with his acquaintance with the public health conditions which are not always made public, he can give valuable assistance to the police. He is also in a position to give help in the billeting of officers. Where empty houses or good class billets are not available he can give information as to good sites for the erection of hutments. Here, indeed, his advice and experience are of maximum value to the central military authorities, for more mistakes are made in the selection of hutment sites and temporary hospitals by neglecting to follow the advice of those who are acquainted with local conditions than in

any other department of military housing, and during the last winter more sickness has been occasioned amongst the troops by neglect to obtain such advice than from any other single cause. Many of the sites selected were chosen after a long spell of dry weather. All evidences of flooding during the previous winter had been obliterated, and the officer in the command of a battalion, anxious to have his men near a town where they might be amused, near the rifle range where they could be trained in shooting, or near some specially good drill-ground, jumped with alacrity at a nice level, but low-lying site as ideal for his purpose. It is undoubtedly a very difficult matter during a long dry spell to convince oneself that a beautiful level area, even though it be lying between two slopes, can, after two or three heavy showers, be converted into a quagmire as, unfortunately, is too often the case. Those who have local knowledge may warn the authorities that in previous years, even when there has been no great excess of rain, the area has been, if not entirely under water, at least dotted with pools and puddles, whilst in seasons in which there has been heavy rain the ground has been submerged. It is so easy to talk of surface and deep drainage, and of the possibility of draining any kind of land, but it is not so easy to effect all this where there is little fall and where, under a shallow surface soil, lies a gault or chalk marl, or some similar water-retaining subsoil. The local medical officer of health appreciates the drawbacks of such a site; in his mind's eye he pictures the seas of mud under foot, and the banks of fog lying on the cold sodden land; he knows the difficulty of inducing the men to keep the windows open; he has visions of damp clothes and bed-clothing of the men who lie in these badly ventilated and damp huts, however well constructed, and of the chilled skin and lowered vitality of the men going out into the chill morning or night air, exposed to the cold by rapid evaporation of moisture from the damp clothes. All this, combined with the slowly reacting and relaxed skin, bringing about, or allowing of, an enormous loss of heat from the dilated vessels. Men, housed under these conditions, are bound to suffer from any, and every, infective illness whether contracted outside or from those returning from home furlough.

During times of peace military hygiene has a tendency to run largely in the direction of the disposal of kitchen refuse, the construction

of latrines, and general details of camp sanitation. The small staff of the R.A.M.C. sanitary service engaged in attending to the general sanitation and ventilation of permanent barracks and hutments is, of course, quite insufficient to leaven the large medical staff that has to be brought together in war time. Fortunately, well-trained medical officers of health with a knowledge of both civil and military sanitation are always available for service in the Territorial Army; but to take charge of the large numbers of recruits for the new Regular Army it is impossible to obtain the services of more than a very small number of seasoned medical officers. Most of these have been brought from retirement, and have been placed in administrative positions from which they may guide and control the numerous junior medical officers who have offered their services, and who are, as a matter of fact, the only other medical and sanitary officers available, and whose special training has been begun and has to be carried on along with that of the battalions with which they are associated. To both these sets of men the services of the civilian medical officers of health are invaluable. He confers with the one and advises the other. The isolation hospital over which he has command must serve temporarily at any rate, and in some cases permanently, as the isolation hospitals for infective cases from camp, hutments, and billets alike. Should it be necessary to add to this isolation hospital accommodation, this must be done through the medical officer of health. Then, when it comes to the filling of the isolation hospital, his services are still in demand. The younger men of the R.A.M.C. have had little opportunity of studying infectious diseases of any kind, whilst even those of older standing have not had much experience of such conditions as measles, especially in the epidemic form, German measles, scarlatina, diphtheria, and the various types of influenza. Typhoid fever, syphilis, and other venereal diseases they may understand better than does the civilian medical man, but children's maladies, which are so troublesome when they attack bodies of young troops, and account for such an enormous proportion of their morbidity when they are billeted, encamped, or placed in huts in towns, are better controlled by the civilian than by the military sanitary officer. Under these conditions the assistance and experience of the medical officer of health are again invaluable. It is not only his advice as regards

the administrative work that counts, it is his greater skill in diagnosis, his knowledge of existing epidemics, and his experience of the degree and period of isolation necessary to prevent spread of infection. His constant practice in examination and diagnosis and his intimate association with aberrant forms of these various diseases enable him to keep his finger on the pulse not only of the civil, but of the military elements of his community and to take early precautions to cut short epidemic outbreaks. Indeed, as sanitary adviser to the authorities in a considerable area, I have had an opportunity of seeing how great a part the civilian medical officer of health has played in cutting short, or at any rate helping to deal with, just these outbreaks of scarlatina, measles, German measles, diphtheria and influenza.

So far I have insisted upon the value of the special experience and local knowledge of the medical officer of health to the sanitary advisers of incoming troops, but the fact of these being so valuable has only served to bring into stronger relief, in my mind, the vast difference between the conditions under which the health of the military population must be maintained and those under which the health of the civilian population is preserved. It has been my lot from time to time, in connection with outbreaks of influenza, German measles and measles, to make tours of inspection of camps and barracks, and especially of hutments provided for the purpose of housing Kitchener's recruits, and I now realise the enormous difficulties that confront the military sanitary officer, difficulties which he has to overcome, even in such an apparent trifle as maintenance of "respectable" ventilation in the best planned hutments. At first I thought that the moving spirits in the presentation of these obstacles were the recruits who, unaccustomed to camp life, were afraid of the night air, or, indeed, of any fresh air except that found outside, but on more careful enquiry I found that it was not they but the old campaigners who carried their dislike to ventilation to the greatest extremes. In one camp of over 1,300 men—a camp to which I have already referred—on going round at 6.30 in the evening I found that, under the conditions maintained, the atmosphere was simply abominable. It was the same story, hut after hut—closed windows and doors, a roaring fire in a tortoise stove, and the men lazy and lethargic looking. Had the huts been badly constructed air would have crept in somewhere, but the huts were

admirably built, the floors were well jointed, the doors and windows fitted, the outside shell was weatherproof, and the inside matchboarding was as well jointed as the floor, and at times I could not help regretting that here we had none of the jerry building of which we have seen such records in the newspapers. The surgeon in charge of the camp told me that it had been put in orders that at least three windows in each hut should be kept open. What we actually found was one window opened carefully for two or three inches in each of two huts out of 45, and that was all, and I was assured that had a guard been mounted in each line, or a party sent to patrol the lines, the windows would have been shut as soon as the back of the patrol was turned, and he was afraid that the guard would have so much sympathy with the men who were in the huts that, during a greater part of the night, a blind eye and a deaf ear would be turned to the doings or misdoings of the men in occupation. The site of the camp in question is not a good one, undoubtedly, but the latrines, water-closets and sewerage are as well planned and excellently carried out as are those of any borough; the kitchens and food are all that could be desired but the sick-rate was extraordinarily high. Now for the moral! Within three days of ensuring better and more permanent ventilation the number of cases reported at sick parade fell to about one-eighth—say from 80 to 10—and although several cases of serious infection have since been reported almost daily, the numbers of sick from sore throats alone is less than one-fifth of what it was before the ventilation was improved. Under these conditions of bad ventilation one was not surprised to find that German measles—with a short period of high temperature, followed by a rapid and complete defervescence and a peculiar mottled rash, especially on the chest, and general enlargement of the superficial lymphatic glands—was greatly in evidence; that numerous cases of influenza, in which nasal, faucial and laryngeal catarrh, with an evanescent measles-like rash, were also reported; that a couple of cases of diphtheria, one of which at least gave a culture of the diphtheria bacillus, made their appearance, though fortunately, with the assistance of the medical officer of health, who diagnosed the cases at once and removed them to the isolation hospital, they did well; that an outbreak of measles followed in quick succession, suffused eyes, catarrhal symptoms in the nose and throat, a sharp but

short rise of temperature, a frontal and chest rash and Koplik's spots, but no glandular enlargement, all fairly characteristic features of the disease—in most cases a mild type.

It was recognised that a few cases of measles occurring under such conditions must, in all probability, lead to an epidemic, and the early cases, when they occurred, were isolated and removed as soon as possible to the borough isolation hospital. A careful outlook was kept for the appearance of Koplik's spots in the mouth and for a rapid rise in the temperature, so characteristic of this disease, and, although the cases seemed to come to an end it was feared that within about a fortnight of the appearance of the first batch of cases there would probably be another and larger crop of similar cases, and arrangements were made with the medical officer of health to meet the demands on his isolation space that were looked upon as pretty sure to arise. Recognising that the disease was of a comparatively mild type, and that the isolation accommodation available would probably not be sufficient to receive the whole of the cases from an epidemic of the magnitude expected, it was arranged that one or more of the huts (according to the number of cases to be treated) in the camp should be set apart as preliminary isolation huts, that the patients in whom measles was diagnosed should be sent to the isolation hospital, there to be kept under observation. The second crop came, sure enough, and in such numbers that it was decided to open the smallpox huts that had not been used for years, and convert them into a second isolation hospital. These also were soon filled, and it became evident that it would be necessary to divide the cases into mild and more severe; that is, those who did not require special nursing and those who did. Severe cases were drafted to the isolation hospital or the smallpox huts, the mild cases to a couple of huts set apart for their reception at one corner of the camp. A further measure also taken in consultation with the medical officer of health was to set aside one of the huts for the reception of convalescents in whom the disease had run a mild course, or in whom there had been no complications and recovery was taking place rapidly. By this arrangement a large number of beds for the more severe cases was available, and patients who required nursing could receive all necessary attention, whilst those who no longer required special care could be drafted

back to the huts. All this would have been impossible without the help and advice of the civil medical officer. The plan adopted may not have been the best conceivable, but it certainly appears to have been the best available.

Before I close, and in connection with this question of ventilation, may I be allowed to refer to a matter not exactly germane to my subject but one of enormous importance to our troops, not so much those who are going to the front as those who are being trained at home, and are living under conditions differing widely from those to which they are accustomed.

Infective cerebro-spinal meningitis, so far as one can learn, and from the cases one has seen, is essentially a disease of the jail or the barracks, and I am not yet convinced that it was not one of the types of the old jail fever. Although we have no records of this condition as a special disease earlier than 1805, those who have described it in different parts of the world have always, in the first instance, been prone to mistake it for the old jail fever—typhus or typhoid, and, although I have the greatest respect for the powers of observation of the physicians of the 17th and 18th centuries, I feel that they were seldom called upon to exercise their powers under favourable conditions amongst the patients who died like flies in the prisons and hulks of these periods, and just as typhus and typhoid were for long classified as one disease and as one of the forms of jail fever, so I cannot but feel that cerebro-spinal meningitis may have been an unrecognised form of spotted, or jail fever.

Many of the well-authenticated outbreaks in France, in Ireland, in Germany, and in the United States have been characterised by high temperature, intense headache, sometimes by profound coma, sometimes by a muttering delirium, almost invariably by a peculiar retraction of the head and by pain in the back and lower limbs, by herpetic outbreaks, such as one meets with in acute pneumonia, by peculiar rashes, petechial hæmorrhages or, in some cases, by a well marked bilateral purpura hæmorrhagica. With cerebro-spinal meningitis there may be a condition of septicæmia, especially in extreme and well marked cases, but from a careful study of such information as is at present available, and from observations made on a few cases, I am strongly of opinion: (1) that infective cerebro-spinal meningitis is a disease associated essentially with overcrowding and bad ventilation,

and that bad ventilation rather than the mere overcrowding is the determining factor; (2) that it is no longer a jail fever, in civilised countries at any rate, as our jails are now as well ventilated as are most modern dwelling houses; (3) that it is a disease of the barracks and not of the open camp, though when weather is bad and tents are good it must be recognised that the conditions for its development even under canvas may not be wanting. Speaking not long ago with a very observant military sanitary officer who has had considerable experience of barrack life, I was much struck by the comment which leaped out at once when he heard that a number of streptococcal sore throats had been brought from one area, "there is no one looking after the ventilation of that place." And this proved to be a true bill, and you may take it that wherever you find a "ventilation crank," as he is called, there you will find little or no throat mischief, whilst wherever you allow men to take the ventilation of their huts under their own care there throat mischief abounds, and where throat mischief abounds cerebro-spinal meningitis has a chance of gaining a foothold. Epidemic cerebro-spinal meningitis usually occurs in the early spring when men, to escape the cold, shut out fresh air, when catarrh is rife and when, especially after long-continued periods of wet and cold, the vital powers, if we may so term them, have been depressed, the activities and resisting powers of the organism generally lowered and the protecting membrane of the upper part of the respiratory tract damaged locally. Many years ago I came to the conclusion that in both children and guinea-pigs tubercular meningitis resulted from invasion by the tubercle bacillus of the tonsils and adenoid tissue surrounding the pillars of the fauces, the soft palate, and the velum palati, these bacilli passing either directly by the finer lymphatics into the large lymphatic spaces near the base of the brain, or perhaps making their way in and around the vessels leading from the tonsils. Now, I cannot help being struck by the marked weakening of the defences of the nares and fauces that appears to precede the appearance of the Meningococcus in the cerebro-spinal canal. Whether it be a lymphatic invasion in the first instance followed by an invasion of the blood vessels, or whether it is a primary invasion by the blood vessels, I do not feel competent to offer an opinion at present, but that in its milder form it presents

but slight evidence of a hæmal infection, whilst in the more severe cases it is distinctly septicæmic in character, appears to be beyond doubt. On one point I agree most thoroughly with most of those who have had a wide experience of the disease, and that is that healthy individuals may undoubtedly act as carriers. Moreover, I am now convinced that for every case of cerebro-spinal meningitis diagnosed, half-a-dozen or more extremely mild cases may escape detection especially during the early stages of an epidemic. It follows, if this be true, that the early attacks, which may be very numerous, may be comparatively mild, and that only as an extremely susceptible individual is attacked does a more severe case make its appearance. Further, a patient who has been a carrier for some time may suddenly develop the disease under conditions in which his resisting powers become impaired, as he develops an attack of catarrh, is chilled and depressed by a spell of cold weather, or as he is exhausted by want of food, by over-exertion, by lack of sleep, or by an attack of some minor or subsidiary disease.

I am convinced that we shall have the worst results of this outbreak of infective cerebro-spinal meningitis at home, but, knowing the conditions under which it has made its appearance, we may look forward with confidence to getting rid of it by thorough ventilation of our huts. This I am satisfied is of far greater importance than isolation; you may isolate as much as you like, but if you do not ventilate there will be little improvement. With improved ventilation, more blankets may—indeed, must—be required, and it is to be hoped that there will now be little difficulty in providing an extra blanket for every man sleeping in hutments. Only by keeping him warm whilst he sleeps can you get him to accept adequate ventilation with a good grace, and, indeed, only by keeping him warm can you enable him to sleep soundly. A cold man, unless freezing, never sleeps well.

Finally, until better weather comes, it would be well that those in charge of the exercising and training of our recruits should be warned that exhaustion due to overwork or lack of sleep is one of the most potent predisposing causes of cerebro-spinal meningitis, and that men suffering from throat mischief should be allowed to rest, should be kept warm, but in a well-ventilated room or hut.

In connection with this, one last word as to the feeding of troops. The rations supplied, so

far as I have seen, are excellent in quality, sufficient in quantity, and usually well-cooked and appetising, but from the strictly hygienic point of view the arrangement of meals is not satisfactory. In many camps and billets the recruit who, before joining the colours, has been accustomed to take a supper an hour or two before he retires to rest, has his last official meal between four and five o'clock, and, unless he provides for himself, has nothing to eat until his eight o'clock breakfast, before which he has had an hour's hard exercise, next morning. Watching some recruits drill, and noting their physical inability to throw themselves heartily into their work, I suggested to the officer in charge that this was due to want of food, and remarked that I should not be astonished to see some of his men faint before the hour's work was completed. The words were scarcely uttered when a man fainted, and on careful inspection we found that several were in an almost similar condition. After this, coffee and a bun were served out to these men before their morning drill, with most satisfactory results both as to their mental, moral and physical condition. I would suggest, therefore, that some official meal—light, perhaps, but warm—should be served out to all men as soon as they rise during the period of training. It is objected that they will not have this when they get to the front. I am not so sure of that, and there can be little doubt that if they have it now, and are gradually built up and strengthened, they will stand less in need of it when they do get to the front, and when they have to withstand the attacks of disease.

I have wandered somewhat from my text, gentlemen, but I think you will see that a single thread runs even through my disjointed remarks. What that thread is I hope will come out in the discussion.

DISCUSSION.

The PRESIDENT said that he felt sure the interesting and specially opportune paper to which they had just listened would call forth discussion which would make it even more valuable and instructive.

Major J. S. TEW, R.A.M.C. (T.), said he was sure many of the recommendations made by Professor Sims Woodhead would be of practical service, and more especially as regards ventilation. Instructions were recently issued to him to raise the cubic space in huts or barracks from 400 to 600 cubic feet per man whenever cerebro-spinal meningitis was present or threatened. In the West of Kent they were generally well situated as regards water supply. When acting as a

member of the Territorial County Association several years ago he prepared a map of the public water mains and their ramifications in his area, giving size of mains, pumping stations, reservoirs, etc., and Dr. Howarth, the first medical officer of health for the county, later completed it for the whole county, so that the military authorities when selecting camping grounds would know what kind of water supply was available for the troops, and the probable quantity in that particular part. As regards feeding, he would like to ask if Professor Woodhead's remarks applied to private billets. He considered that in small private billets it was more satisfactory for the men to be boarded at so much per day than to have weighed rations (raw meat, etc.) given out to take to the houses to cook. If the boarding was not satisfactory they could generally move to another billet. If uncooked rations are supplied with a view to getting men to cook their own food, it does not appear to succeed, as the rations usually find their way into a common pot of the working-class household, and the man takes his share. He did not, of course, refer to billeting of a number of men, but only when one or two are billeted in small houses. Personally, he had got great assistance from the attached members of the Army Medical Corps, especially the younger members, who had received his recommendations cordially and had co-operated with the best results in improving the camps and billeting arrangements. Some seniors had not received his suggestions so enthusiastically. He had had some difficulty as to the adjustment of expenses between the military and local authorities, but not much. As a rule, he had taken the line in the taking over of large empty houses, that the owner should provide and see that the sanitary arrangements were satisfactory and adequate for a normal number of occupiers; but that if, on account of the increased number of occupants, additional latrines, ablution facilities, or refuse removal was required, that such extra expense should be borne by the military authorities. As to hospital accommodation, in his district they had made arrangements for the reception of enteric, scarlet fever, and diphtheria cases into the small local hospitals at a moderate fixed charge per week. He had so far had no cases of cerebro-spinal meningitis among soldiers in his area. In cases of measles they had in one place secured an empty house, and the patients were looked after by an orderly, and had done well. Some trouble had occurred from vermin and itch, but by establishing some cheap baths with gas and geysers, and by treating the clothes in an emergency disinfectant, they reduced the cases rapidly.

DR. R. VEITCH CLARK (Croydon C.B.) said he had had considerable experience both with

naval and military officers in connection with billets for the men, and he had found that with hearty co-operation with these officers they were able to exclude houses for billeting purposes where certain diseases had occurred. In one or two instances where there had been some mild outbreaks of infectious diseases, with the co-operation of the naval and military authorities, certain parts of the town were put out of bounds, and the troops were forbidden to go into these areas. That related especially to an outbreak of scarlet fever. So far as ordinary cleanliness was concerned, and the destruction of vermin, they had done an enormous amount of disinfection of the men's clothing. In addition to that the naval authorities had had the use of one of the municipal public baths, where the condition of the water was properly regulated. For the use of the isolation buildings for infectious diseases the military and naval authorities paid £2 per patient per week, and for the use of the bath they paid the amount of the average previous takings. In regard to the swimming baths one difficulty they had to encounter was the extreme dirtiness of the water. They had to renew the water every day. He advocated the addition of chlorine to the water, which absolutely destroyed all bacterial life. From experiments he found that a one-half part of chlorine to a million parts of water was sufficient to make the dirtiest water absolutely sterile, and would prevent the adherence to the walls and floor of the bath of a bacterial mucoid film. In his area they had had in all ten cases of cerebro-spinal meningitis from the Royal Naval Brigade. In the first week they had two cases, in the second six, and this week two more. Unfortunately, six of the ten admitted had died showing acute delirium. He had discussed the matter with the P.M.O. at the Crystal Palace, who reported to the Admiralty, which made a special enquiry into the subject. The Admiralty at first proposed to put 10,000 men in the Palace and grounds, but now that number had been reduced to 6,000. The men were both housed and drilled in the Palace, which was a most absurd arrangement, since there was ample room in the grounds outside. Since the inquiry things had been changed, and the men were nearly all now drilled outside. Further, the arrangement of the sleeping accommodation had been changed; in the space where four hammocks had been slung there were now only three. The ventilation was accordingly improved, and the number of cases of sickness had been diminished. As to the way in which the cases arose they were probably infected from "carriers" in manner similar to that suggested by Professor Sims Woodhead. He had been specially interested in hearing Professor Woodhead's remarks as to the infective organisms being conveyed from person to person. In the

Leith outbreak of 1905 the individuals were largely children, a considerable number of whom were in the families of dock labourers; of the latter several were engaged in working upon the repair of a vessel in Leith docks. Plates of suitable media were exposed in the engine-room in this vessel and the Meningococcus recovered from these plates. It was possible that the disturbance of the accumulations of dust in the space beneath the flooring of the Crystal Palace may have had something to do with the original infection in the Naval Brigade.

DR. A. H. BYGOTT (West Suffolk County Council) said that in his experience it was easy for a want of co-ordination to arise between the military and civil authorities, but, in his own area, thanks to his intimate association with the military sanitary staff, things had worked very smoothly. Sometimes military methods do not commend themselves to civilians, as in one case he had heard of a rota of military medical officers who visited infectious disease hospitals each day, so that the patients had a fresh doctor every day. This might be of value to the medical officers, in giving them experience of ordinary infectious diseases, but, if this method were used for treating bad cases of typhoid, the result might be disastrous to the patients. As showing the view of some local people as to ministering to the comforts of the troops, he instanced a small town, in which the methods of drainage were into cesspools, in which one case, at any rate, the cesspool was in the middle of the road. The whole of the water supply was taken from shallow wells, and, a short time before the outbreak of war, a few cases of cerebro-spinal fever had been notified there. Arrangements were being made, on an elaborate scale, for the treatment of wounded in a public hall in this town, bedding being taken from an adjoining workhouse, which was situated on a hill in the neighbourhood, and had a good water supply. This state of affairs was reported to the War Office, and, at present, the accommodation has not been utilised. He (Dr. Bygott) hoped that the great difficulty which was being felt in dealing in verminous cases, would point out a simpler, effective method of treatment, which might be utilised for dealing with school children, so as to obviate the use of an elaborate disinfectant. He (Dr. Bygott) thanked Professor Sims Woodhead for his most interesting paper, and asked him if he would outline his methods for the bacteriological investigation of cerebro-spinal fever.

DR. R. A. LYSTER (Hampshire County Council) said that cerebro-spinal meningitis has been prevalent among the recruits in Wiltshire, North Hampshire, and crossed over the border to West Sussex. He wished he could be quite convinced that Professor Woodhead's theory was correct.

His experience hardly fitted in with the theory that it was due solely to overcrowding and bad ventilation. It would not fit in with more than 60 per cent. of the cases. The prevalent type of the disease was very severe, and a great majority of those attacked died in great agony. His own idea was that cerebro-spinal meningitis was spread in much the same way as diphtheria, *i.e.*, from person to person, sometimes *via* contacts. He did not believe in the quoted experiments about dust, as they were contradicted by the known facts about the organism. His experience was that the disease was a personal matter, and was carried by person to person, and affected selected individuals. Susceptibility was probably increased by overcrowding and bad ventilation. Why it should be associated with troops it was difficult to say. In the southern counties it had appeared among the Canadian troops, and the general local opinion was that it was brought to this country by these troops from Canada. Dr. Lyster also referred to the practical difficulties in the way of bacteriological examination of cases and contacts, and emphasised the necessity of making immediate cultures from swabs, with sub-cultures as soon as the colonies could be distinguished.

DR. A. W. J. MACFADDEN (Local Government Board) said he wished particularly to refer to that part of Professor Woodhead's paper which related to the assistance which could be given by civil health officers in safeguarding the food supply of troops. A large number of the members of the Society had, with their staff of inspectors, been rendering most valuable assistance in this direction from an early period in the war. Shortly after the outbreak of war arrangements were made between the War Office and the Local Government Board to supply the Board's Inspectors of foods with particulars as to Army contracts for food materials, the object being to secure special supervision of these materials at the time and place of preparation. The medical officers of health in whose districts the various factories and food-preparing places concerned were situated, had co-operated most cordially in this scheme of inspection, with results which so far had been extremely satisfactory. Complaints as to the food sent to the Expeditionary Force were practically nil, a condition of affairs which contrasted favourably with the experience in this respect in previous campaigns. The food supply of the troops at home was being similarly looked after, but was a somewhat more complicated matter owing to the large number of smaller tradesmen concerned. He quite agreed with Professor Woodhead as to the undesirableness of sending men to work first thing in the morning without some sort of nourishment. Many senior officers whom he had met held the same view, and had made arrangements for their men to be

provided with a mug of cocoa, or something of that sort, before early morning parade. This would tend to improve the efficiency of the men and increase their resistance to disease. Professor Woodhead had contrasted the arrangement where rations were supplied to men in billets by the Army Service Corps and that by which the food was supplied by the owner of the billet. He (Dr. MacFadden) thought that the former was probably much the more economical arrangement. He was glad to have that opportunity of letting the Society know that the authorities at the War Office were well aware of, and appreciated highly, the excellent work which was being done by medical officers of health in the matter of inspection of food intended for the use of our armies.

DR. T. W. N. BARLOW (Hon. Sec.) said his experience was that the co-operation between the naval and military medical officers and the civil medical officers of health was not always so hearty as had been suggested in the course of the discussion. Those present would remember that the War Office had issued a command that the local medical officer of health should be informed *before* soldiers were encamped in his district, and that his advice should also be sought on the question of billets. This was not always done. In his own district, for instance, huts had been built for 100 soldiers on an unbuilt-upon piece of ground in the very best part of the town, between two houses rented at from £150 to £200 a year, where the ordinary sewage system of the district was not available, thereby increasing the difficulty from a sanitary point of view. He was not consulted until the huts were actually erected. If he had been no doubt a better site could have been found. Moreover, where advice was asked for by the military authorities, and willingly given, it was not always followed. He did not agree with Professor Woodhead that inspection of the food was one in which local authorities could not help. In his opinion the civil authorities were in a better position to supervise the food supplied to the troops than were the military authorities. From enquiries which he had made he had found, for instance, that when meat which was sent in for the use of soldiers was found to be bad, it was the practice to return it to the caterers and get an extra amount the following day; whereas, if the places from which the meat came were rigidly supervised by the sanitary authorities, no caterer would dare to have on his premises bad meat, because in the event of its being found by the local inspector the meat could be seized and he be prosecuted.

DR. CHARLES SANDERS (West Ham) said he did not think that medical officers of health in large towns had the same difficulties to meet as their colleagues in the country. The medical officers of health in large towns had sufficient authority

to deal with considerable numbers of troops without much trouble, whereas in rural districts the medical officers of health might have considerable difficulty in suddenly developing a rural into a municipal administration. He thought that medical officers of health, as a class, suffered from their calling. It was the custom of the medical profession to be practically autocratic critics in dealing with patients; they gave directions which were to be implicitly followed. That was the case in regard to medical officers of health, and their advice was generally followed by the local authorities. But there must be a great deal of give and take between the civil and military medical authorities. In his own district he had not had much difficulty, although it was true he had not always been consulted at first. For instance, when the German prisoners were brought into the district, a huge factory was fitted up, at great expense, for their reception. There was a conflict of opinion in regard to its suitability among the military themselves. He was consulted, and gave an opinion which he believed helped the authorities. He wished to thank Professor Woodhead for the very able way in which he had dealt with cerebro-spinal meningitis, which would be of great assistance to medical officers of health in their civil work after the war was over.

THE PRESIDENT referred to the question raised by one or two speakers as to the advice given by medical officers of health to the military authorities not being always followed. It must be remembered that, however willing a commanding officer might be to follow the advice given him, there may often be military reasons unknown to the medical officer of health which must be taken into consideration by the commanding officer and which may prevent the advice being followed. It was very reassuring to learn from Dr. MacFadden that the Local Government Board had early recognised the necessity for looking after the food of the soldier, and that the services of medical officers of health in this connection had been called in and had received recognition at the hands of the authorities. Where men were billeted in houses they ought to be well fed, and the officers should see that they were. If they were not then another billet should be found without delay. He agreed that the men should have a cup of tea or of cocoa before turning out for the early parade, the work on which was often arduous and exacting.

PROFESSOR SIMS WOODHEAD, in the course of his reply, said: Taking some of the points that have been raised in the discussion without attempting to go over the whole ground, I think we should consider two relating to the Meningococcus: (1) It can persist in an individual without giving rise to cerebro-spinal meningitis; (2) It is

an organism very easily destroyed when the conditions are not favourable and is apparently incapable of existing outside the body for any considerable length of time, during its strongly pathogenetic stage at any rate. It may possibly become more "saprophytic" under certain conditions and then may be capable of living outside the body for a longer period, but of this as yet we have no knowledge. I am not inclined to believe that it is usually carried by vermin, but, on the other hand, I think we must realise that although we look upon the naso-pharynx as the usual portal of entrance it may, under certain conditions, be inoculated directly into the blood by blood-sucking vermin, and it is quite possible that the fulminating or septicæmic type may result from such direct inoculation into the blood stream. That the Meningococcus grows well in the presence of hæmoglobin is evident from the fact that blood agar is an even better medium on which to cultivate it than neutrose, ascitic agar or serum agar. I cannot but feel that the overcrowding and bad ventilation, almost invariably associated with an outbreak of this disease, are responsible for the streptococcal throats that precede its appearance. Here the infective organism, finding its way on to the inflamed mucous membrane of the naso-pharynx, has a nidus in which it can flourish and from which it may attack the patient. This brings me to the point raised by Dr. Lyster, a point on which I am in thorough agreement with him, that in many ways epidemic cerebro-spinal meningitis may be placed in parallel with diphtheria. The organism appears to be capable of remaining in the healthy throat for some time without giving rise to any special symptoms, healthy carriers thus becoming centres of infection. The Meningococcus, too, appears to be capable of setting up a comparatively mild type of disease but, on the other hand, if there is already severe damage to the mucous membrane, if the vessels are congested and there is exudation of the fluid elements of the blood on to the surface of the throat, and especially if these are accompanied by red blood corpuscles, then the conditions for the development of this organism and the production of toxins appear to be favourable and the disease assumes a serious character. Owing to the extreme delicacy of the Meningococcus, the danger of infection, except by personal contact—that is, by actual contagion—appears to be much less than in the case of the diphtheria bacillus which, as we know, can remain alive for such prolonged periods outside the body, and, so far as experience of contact goes, the diphtheria bacillus can remain alive and active in a carrier case for a much longer period than can the Meningococcus. I thoroughly agree with Dr. Lyster as to the difficulty of examining these contacts unless special precautions, such as careful swabbing

immediately behind the soft palate, the transference of small amounts of the material removed to the plate to be examined, and the careful distribution of this over a large surface of an agar medium containing all the elements of the blood, including hæmoglobin. The infective material must not be carried in the swab, but must be applied to the medium at once and the differentiation at temperatures of 22° and 37°C. must be carried out in every case, the Meningococcus growing at 37°C., but refusing to grow at 22°C., the Micrococcus catarrhalis growing at 22°C., but of course more slowly than at 37°C. If care be taken in regard to these details the work should be carried on fairly easily and with satisfactory results. As regards treatment, I am satisfied that where cases of this disease have made their appearance, ventilation, avoidance of contact and the treatment of every case of sore throat with an antiseptic gargle and nose wash, the patient being instructed to use this four or five times a day. Probably the best disinfectants to use are (1) a solution of peroxide of hydrogen; (2) a sweetened solution of bleaching powder or of slightly acidulated permanganate of potash.

As regards the new order as to 600 cubic feet per soldier, I cannot but think that it would be very much better to begin at the other end and to insist that the 400 feet room should be well ventilated. With 400 feet well ventilated a full supply of fresh air may be secured; with 600 feet, if badly ventilated we are after all not much better off at the end of an hour than with 400 cubic feet, whilst the expense of providing this additional cubic space is so great that difficulties are sure to arise and the regulation will be shirked as frequently as possible. Indeed much of it cannot be provided until too late for it to be used. Window ventilation must not be relied upon, of that I am satisfied, especially where old soldiers are concerned, and "as the old cock crows the young bird learns."

Of course, in referring to food inspection I do not refer to the excellent work that has been done by the officials of the Local Government Board and medical officers of health, who I know have improved the conditions under which food is supplied in a most wonderful manner, whilst their education of public opinion on the matter cannot but be of extreme value. I should like to point out, however, that it is quite impossible for a medical officer of health to control even in a very small degree the rations of men billeted in schools and public buildings, whilst even less are they able to do this in private billets.

I am very glad to hear that chloride of lime has been used in connection with the baths at Croydon. This method of purifying and oxidising the water has been used in the United States for

some little time, and I am glad to find that they there utilise my method of determining the presence of excess of available oxygen and chlorine by the iodide of potassium and starch test. They simply work this as a matter of routine, and, from public reports, with the most satisfactory results. I wish I could obtain as good results as have been reported.

In answer to Dr. Sanders' question, I can only say that I look upon the medical officer of health of the district as the only man who holds all the strings and knows all the conditions.

There are many other points to which I should like to refer, but many of these have been answered during the course of the discussion, and it now but remains for me to thank you very heartily for the kindly manner in which you have received this short and somewhat discursive paper.

CEREBRO-SPINAL FEVER IN MILITARY CAMPS.

THE following Memorandum has been communicated by the War Office to army medical officers:—

MEMORANDUM ON CEREBRO-SPINAL FEVER IN MILITARY CAMPS.

DIAGNOSIS.

1. *Clinical*.—This disease is characterised by the following symptoms and signs:—Intense headache, pain and stiffness in the muscles, especially of the neck, retraction of the head, fever, vomiting, delirium, and subsequently coma. A positive Kernig, strabismus, and photophobia are common early manifestations. A purpuric eruption occurs in some cases. It should be remembered that the disease is protean in character, that atypical cases may occur in which the usual symptoms are suppressed—for instance, a condition of sore throat may suddenly be succeeded by coma and death.

2. *Bacteriological*.—The causative micro-organism is the Diplococcus Intracellularis of Weichselbaum, which has primary residence in the naso-pharynx.

In men definitely attacked this micro-organism is best isolated from the cerebro-spinal fluid, which is found to be under increased tension, and frequently turbid from polymorphonuclear leucocytes, many of which contain the Diplococcus, as can be ascertained by a study of stained films of the centrifugised deposit.

It is necessary, therefore, to examine the cerebro-spinal fluid in all cases of meningitis in order to establish the diagnosis.

TREATMENT.

Men definitely attacked must be regarded as infectious, and removed to a special isolation hospital.

Anti-meningococcal serum should be injected intra-spinally after removal of an equal amount of cerebro-spinal fluid. The serum should be warmed to the body temperature, at least 20 c.c. injected, and the foot of the bed should be raised after the injection. The dose should be repeated daily. Intercurrent conditions will be treated as they arise, special care being taken of the eyes.

PREVENTION.

The clothing, bedding, and quarters of men definitely attacked are to be disinfected, and, as far as is practicable all contacts are to be segregated. Pending the result of the bacteriological examination of their naso-pharynx, these men should be treated with antiseptic sprays and gargles twice a day.* The men who are reported to be carriers should be transferred to other quarters, and isolated until two successive swabs taken from the naso-pharynx are returned as negative; the remainder in whom the results are negative may be allowed to return to duty, provided the throat is normal.

TECHNIQUE OF PASSING THE NASO-PHARYNGEAL SWABS.

Two matters are of prime importance in this connection:—

1. Owing to the similarity of the Meningococcus to several less harmful micro-organisms normally present in the mouth, it is important that the swab should be as free as possible of contamination with saliva.

2. As the Meningococcus readily dies on the swab, it is desirable to make the cultures as quickly as possible.

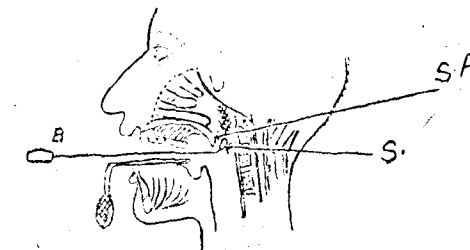


Diagram after Netter & Debré, showing the method of swabbing the naso-pharynx of contacts for the Meningococcus. S.P. = Soft palate. S. = Swab. B. = Handle of swab.

With a view to avoidance of contamination by saliva, a special covered swab such as that introduced by West is suitable. The man is seated facing the light. His mouth is opened as wide as possible, and the tongue depressed with a spatula. During phonation the covering tube containing the swab is passed behind the soft palate, and the swab extruded so as to come in contact with the naso-pharynx. The swab is then drawn back into the covering tube, and the instrument removed.

* Potassium permanganate 1:1,000 in a solution of 1:5 per cent. sodium sulphate is a suitable gargle, and for a spray the following:—Iodine, grs. 4, menthol, grs. 8, pepsin, to 1 oz.

MODE OF DEALING WITH THE SWAB.

The requirement in this case is to obtain growth of the bacteria in separate colonies. Unless great care is taken the medium is apt to be too heavily inoculated.

If Petri dishes are available they provide the best means of attaining this object. Such Petri dishes or "plates," already poured, should be brought to the spot and inoculated at once. In this case the plate should be kept inverted; it is advisable to lightly touch one portion only of the medium with the swab, and subsequently to rub over this spot with a sterile glass rod. If possible the rod should be rubbed over a second plate in addition.

It may not be possible for the bacteriologist to be present at the time when the swab is taken. In that case the swabbing should be performed by a specially trained attendant, who should inoculate the plates at once. If this cannot be done, the swabs must be placed in a sterile close-fitting metal box, and delivered at the laboratory within two hours, where the plating will be carried out.

NOTE WITH REGARD TO THE BACTERIOLOGICAL IDENTIFICATION OF THE MENINGOCOCCUS.

1. *Cerebro-spinal Fluid*.—The bacteriological diagnosis can usually be made by the presence of a Gram-negative Diplococcus in stained films of the centrifuged deposit.

For isolation of the Meningococcus the necessary media may be obtained from the Central C.S.M. Laboratory, R.A.M. College, Millbank. Telegraphic address: "Jaspag, London." Telephone: Victoria, 2877.

2. *Secretion from the Naso-pharynx*.—The stages of the investigation are as follows:—

1. Examination of separate colonies on the cultures. Colonies of the Meningococcus appear at 37° C. in 24 to 48 hours. They are larger than colonies of the accompanying Pneumococci and Streptococci. They are clear, smooth and transparent, have a firm outline, and are very characteristic. A portion of one of these colonies taken up on a platinum needle is found to emulsify readily in a drop of water on a glass slide.
2. Gram's stain. A film made from one of these colonies shows Gram-negative Diplococci.
3. Sub-cultures are made, and placed at 37° C. and at 23° C. respectively.

The Meningococcus does not grow at 23° C., whereas the vast majority of the Gram-negative cocci of normal saliva grow readily at this temperature.

In view of the sharp distinction which this test provides, it will be sufficient for practical purposes

to regard the suspicious cocci that have passed it as Meningococci.

Confirmatory tests should be employed for greater accuracy as follows:—

4. Fermentation tests. The Meningococcus ferments glucose with the production of an acid reaction, but fails to change saccharose. These tests are applied by making sub-cultures at 37° C. in media tinted with litmus and containing the above sugars respectively.
5. Agglutination. The Meningococcus shows positive agglutination when brought in contact with anti-meningococcus serum.

OBITUARY.

THE LATE EDWARD COX SEATON, M.D., F.R.C.P., F.I.C.

OUR readers will learn with much regret of the death of Dr. Seaton, after a brief illness, at his home in Walpole Street, Chelsea, on February 20th.

Dr. Seaton, who was born in 1847, went to Tonbridge School, and then received his medical education at St. Thomas' Hospital, graduating with honours as M.B. at the University of London in 1870 and M.D. in 1871. He was a member (after 1886 a Fellow) of the Royal College of Physicians, and for a time proposed to himself a career as consulting physician. In 1874, however, he became a candidate for the post of medical officer of health at Nottingham, where he was selected from among 34 candidates. Although he also became physician to the Nottingham General Hospital, he soon found public health work was his main occupation. Nottingham at that time had a population of about 90,000, but was naturally growing and was nearly doubled by a large borough extension in 1877. Very soon after his appointment Seaton realised the serious blemishes in the public health of the borough, particularly its huge middensteads with vast accumulations of faecal and other organic refuse, and the closely-packed tenements in the courts, yards and alleys, which constituted the poorer parts of the town. His reports, with those of the chief sanitary inspector, were instrumental in securing the conversion of privies to pail closets in all the older part of the borough, and later, between 1880 and 1884, he took an active share in a great clearance of slum dwellings known as the Parliament Street area. Apart from promoting sanitary work of this sort, he introduced into Nottingham a new conception of the scientific side of the responsibilities of the medical officer of health, particularly in the matter of tracing infectious disease, and made a beginning with the isolation of infectious cases. A voluminous report in 1878 on the health of the borough and the

methods of improving it attracted a great deal of attention at the time. In 1884 Seaton returned to London, and was soon after appointed medical officer of health for Chelsea. With this he combined the work of public analyst. He held these offices for seven years, and at this period was active in many of the important public health movements of the day, particularly with that which led to the passing of the Infectious Disease (Notification) Act, 1889. He had been appointed in 1886 Lecturer on Public Health at St. Thomas' Hospital (which he retained till 1908), and in 1890 he acted as a special commissioner for the Government inquiry into Housing of the Working Classes. Among

and influence in a county of this character is, or at any rate was, more restricted than in the case of large industrial or agricultural counties, which are remote from London, and where the work of district medical officers has been less developed. Seaton's most noteworthy official efforts in the county were directed to the purification of water supplies and rivers, and to the establishment of isolation hospitals by combinations of local authorities. The proper use and function of isolation hospitals became a favourite subject with him, and his views were set out in the Milroy lectures of 1896, and also developed later in the Chadwick lectures on "Infectious Diseases and



THE LATE EDWARD COX SEATON, M.D., F.R.C.P., F.I.C.
President of the Society of Medical Officers of Health, Session 1897-98.
Hon. Secretary of the Society, Session 1888-89.

his contributions to public health literature at this period was an address on "Local Sanitary Administration" to the Public Health Section of the British Medical Association. He served for a time on the Metropolitan Asylums Board, and the arrangements made for the admission of students to the London fever hospitals for courses of instruction were largely due to his initiative. In 1891, when county medical officers of health were being appointed, Seaton was chosen by the Surrey County Council as their first health officer, and held this post until 1910. The position was a somewhat difficult one, as for various reasons the scope of a medical officer of health's work

their Preventive Treatment," given in 1910. On retirement in 1910 Dr. Seaton was appointed consulting medical officer of health, county councils having, unfortunately, no powers to confer a pension. The capricious termination of this appointment by the county council last summer is a matter on which we prefer not to dwell here; the episode is one of the least creditable to local governing bodies in this country.

As a young man Seaton had been closely associated with the work of the central public health offices; his father, Dr. E. Cator Seaton, was a medical officer with the Privy Council, and had succeeded Sir J. Simon at the Local Government

Board. Seaton's knowledge of Simon's work was thus intimate, and afterwards was turned to good account when he edited the volumes of Simon's Public Health Reports issued by the Royal Sanitary Institute. Simon and his contemporaries, in thinking and writing about the relations of medicine to State policy, made much of distinction and dignity which should attach to medical advisers of central or local Governments, and Seaton had this view strongly. In his official life he took his work seriously, and in any matter, great or small, was accustomed to weigh up all sorts of considerations before deciding on the personal position which he should adopt. The same habit of mind made him invaluable in the work of the societies and public bodies. Those who attended gatherings of the Society of Medical Officers of Health, the Sanitary Institute, the Epidemiological Society or Society of Public Analysts, in the nineties especially, will remember that Seaton could always be relied upon to say the right thing, and to import into the discussion, often with much quiet humour, considerations which were in danger of being neglected, but had only to be stated for their force to be appreciated. A younger generation will remember him as a good lecturer and teacher, and as a scrupulously fair examiner, while many men who have held district appointments in the county of Surrey will have a grateful recollection of the guidance and assistance that he was always glad to give. For a wider public he leaves a distinguished record of good and varied service to preventive medicine.

THE LATE LIEUT.-COL. ROBERT BURNET.

We much regret to have to record the death by accident of Lieut.-Col. Robert Burnet while on military duty in connection with the Wessex Division R.A.M.C. (T), to which he was attached. He was medical officer of health of Cornwall, and a much-esteemed member of the Society of Medical Officers of Health. His life was cut short at its highest point of fulfilment. Success had crowned his efforts in no light measure, and although one can wish no man a happier fate than that he should, in the prime of life, give that life for his country, yet a host of friends will mourn his loss, and the deepest sympathy will be felt for his young widow and his fatherless children.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856.

RECONSTRUCTED 1888.

INCORPORATED 1892.

AN Ordinary Meeting of the Society was held at the Offices of the Society, No. 1, Upper Montague Street, Russell Square, London, W.C., on Friday, February 12th, 1915, at 5 p.m. *Present:* Dr. Herbert Jones, President (in the chair), and

Drs. R. A. Lyster, H. Beale Collins, A. W. J. MacFadden, W. G. Willoughby, A. Bostock Hill, Sidney Davies, F. C. Linton, R. Veitch Clark, C. Sanders, Wm. Butler, G. F. Buchan, B. C. Stevens, Jos. Cates, M. B. Arnold, J. R. Hutchinson, S. N. Galbraith, E. Colston Williams, W. H. Symons, A. H. Bygott, J. J. Jervis, J. S. Tew, J. Tate, J. R. Kaye, and T. W. N. Barlow (Hon. Sec.).

Minutes.—The minutes of the previous ordinary meeting, held on Friday, January 8th, 1915 (*vide* PUBLIC HEALTH, February, 1915, page 119), were taken as read, were approved and duly signed by the Chairman.

Correspondence.—DR. T. W. NAYLOR BARLOW (hon. secretary) said he had received from Dr. Hope and Dr. T. Ridley Bailey letters of regret of inability to attend this meeting on account of prior engagements.

Election of Fellows and Associate.—The next business being the election of Fellows, it was proposed and seconded that the President should ballot for the Society for the election of the nominees on the agenda paper as Fellows. In the course of the discussion it was said that there had been instances in which candidates for Fellowship had been blackballed, and it was very desirable that the Society should retain the election in their own hands. On a vote being taken by hand, the motion was lost. The following candidates, who had been duly nominated, were then ballotted for, and as the result were declared by the President to be duly elected:—

Fellows.—CHAS. HENRY ARTHUR ALDERTON, L.R.C.P. and S., D.P.H., 24, St. Nicholas Terrace, Gaywood Road, King's Lynn, Norfolk (Assist. S.M.O.); THOS. SPOT ALLAN, L.R.C.P. and S., L.R.F.P. and S., 12, Thorpe Dene, Thorpe Road, Norwich, Norfolk (Assist. S.M.O.); ALEX. DAVID CAMPBELL, M.B., Ch.B., "Merchiston," Bennichy Road, Kirkcaldy, County of Fife (Assist. M.O.H.); WALTER GARSTANG, M.B., Ch.B., L.S.A., Sherwood House, Hucknall Torkard, Notts, Hucknall Torkard U.D. (M.O.H.); HENRY W. HARDING, M.D., D.P.H., 33, Prospect Hill, Walthamstow, Essex, Walthamstow (Assist. S.M.O.); HARRY WM. MELVILLE REES, M.R.C.S., L.R.C.P., Tuberculosis Dispensary, Portsmouth, Portsmouth (Tuberc. Officer); JOHN LOGAN STEWART, M.A., M.B., Ch.B., D.P.H., 26, Hermitage Road, Crumpsall, Manchester, Lancashire (County Tuberc. Officer). *Associate.*—WM. A. BREND, M.B. (Lond.), 14, Bolingbroke Grove, London, S.W.

PROFESSOR SIMS WOODHEAD then read a paper on "The Best Way in which Civil Health Officers can give Assistance to the Military Authorities in Time of Mobilisation or of War,"* and a discussion took place, in which the following members joined, viz.:—The President and Drs. J. S. Tew, R. Veitch Clark, A. H. Bygott, R. A. Lyster, A. W. J. MacFadden, T. W. N. Barlow (Hon. Sec.), and C. Sanders. Professor Sims Woodhead replied, and the meeting then adjourned.

* Published in the present issue.

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VOL. XXVIII.

THE NEED OF THE HOUR.

THE letter which Sir Alfred Keogh, Director-General, Army Medical Service, has addressed to the editors of the medical journals makes an especially strong appeal to all medical men who are in one or other of the medical services of the country.

Sir Alfred Keogh tells us in this letter that the need of medical men, both for home and foreign service, is acute, and that every qualified man is wanted who is physically fit and willing to serve. The services of general practitioners are especially wanted, and those of expert surgeons, ophthalmologists, radiographers, etc., will be welcome. Suitable men could be given immediate service. Sir Alfred Keogh adds that it is not desired to denude the country of civil practitioners, but every man who can arrange for his work to be done at home should come forward as early as possible if an adequate supply of medical attendance to the armies in the field is to be kept up. This is, he says, a national emergency, and it is hoped that the medical profession, which has already done so much, will assist the responsible authorities to meet it.

Any appeal made by Sir Alfred Keogh to the members of his own profession is sure to meet with large response, but the magnitude of the task which devolves upon him of supplying adequate medical attendance for the many thousands who will, in the immediate future, need this aid may not be fully appreciated by those who, living in peace and security at home, have not adequately realised the vastness of the work which is being undertaken by the armies in the field. We make, therefore, no apology for devoting our first page to this, which is undoubtedly the subject which beyond all others demands the immediate attention of our profession and those public bodies which they serve. If the matter were less urgent than we believe it to be we are satisfied that Sir Alfred Keogh would not make

an appeal in the terms of the letter which has been published.

A question which is well worth considering in connection with the necessities of the moment is whether some public services might not be suspended with a view to those who are engaged in the work devoting their time to the care of the sick and wounded, whose necessities make the first claim on the medical profession, seeing that these necessities arise from service of their country. The medical inspection of school children is a branch of work to which we attach importance, but how does it appear when weighed in the scale with the case of men who have received grave injuries in fighting for King and Country? Our own view is that this medical inspection of school children might well be allowed to stand over and the services of the medical officers employed in it utilized in the numerous hospitals which are being provided in this country and on the Continent. In many instances these officers have been in recent touch with hospital work, and they would therefore be able to undertake that which is proposed with greater facility than older members of the profession. If education authorities were desirous of maintaining the inspection of school children it should be possible for those who are in practice, women as well as men, to give the assistance which is required and relieve the younger men for hospital service at home and abroad. Under any circumstances, it may be remembered that the inspection of school children is of comparatively recent date, and to revert to the position of a few years ago for awhile should not be thought unreasonable.

We would desire, therefore, to bring to the notice of all those engaged in the various branches of public health service Sir Alfred Keogh's letter, and to express the hope that our members will influence the authorities they serve to let them take part in the great work which is before the country.

THE PUBLIC HEALTH:

A RETROSPECT AND A PROSPECT.*

By THOMAS GIBSON, M.D., D.P.H.,
Medical Officer of Health, City of Wakefield.

AT the outset I wish to thank the members of the Yorkshire Branch of our Society for the honour they have conferred on me. It is an honour which is much appreciated, and none the less that I am fully conscious it is due to the efflux of time rather than to any special merits of my own.

It is my duty, so I am told, to deliver you an address, and in doing so I mean to take full advantage of the privilege attached to presidential addresses of being as discursive as I please.

I wish in the first place to ask you to hark back with me to the middle sixties of the last century and to consider some of the outstanding aspects of the public health of fifty years ago, with a view of weighing up the advances which have been made since that time. If time allows, we may then consider some of the problems which still lie in front of us.

Fifty years ago the population of England and Wales was little more than half of what it is at the present time, and little more than 50 per cent. of the people were living in urban sanitary areas, as compared with something over 78 per cent. at the present time. It is important to remember this increase in urbanisation when we compare the sanitary conditions of to-day with those of former periods, for undoubtedly the increasing aggregation of persons into town communities with a death-rate 23 per cent. above that of rural areas has retarded the beneficial influences of the sanitary improvements which have been carried out.

The birth-rate, then over 35 per 1,000, was approaching its zenith, which was reached in 1876, and since when it has steadily fallen. The illegitimacy rate, based on the number of unmarried women and widows of conceptive ages, was then 50 per cent. more than at the present time. More people, in proportion to the population, married at that time; they married younger, and they had larger families than at the present time. The sexual habits were no doubt more natural than they are now, and this no doubt affords an explanation, at least in part, of the higher illegitimate rate.

The general death-rate of the country fifty years ago was over 21 per 1,000 of the

population, and in town communities it was 26 per 1,000.

The average lifetime for males was then nearly three years less than it was in the 1881-1890 life-table, and in the case of females the average lifetime was more than three years less.

The infantile death-rate was then just over 150, and it continued at a high rate for the next forty years. As you know, an improved infantile mortality has only manifested itself during the last decade.

With regard to the prevalence of infectious diseases fifty years ago, the mortality is, in the absence of notification, practically the only criterion.

Two diseases, which since that date have practically disappeared from the country, were then prevalent, namely, cholera and typhus fever. In the 1865-66 epidemic of cholera—the last we have had—some 15,000 persons died of the disease in England. In passing I may mention that nothing did so much to arouse the sanitary conscience of the nation as this and preceding epidemics of the disease. They were indeed blessings in disguise.

Typhus fever fifty years ago was a cause of a considerable mortality, but how much it is difficult to say, for although Sir Wm. Jenner had definitely distinguished between typhus and typhoid fever in 1850, it was not till 1869 that the Registrar-General was able to statistically separate the two causes of death. We, however, know that during the years 1862-1869, 14,000 cases of typhus fever were admitted to the London Fever Hospital. In 1869 the mortality from typhus is given as 193 per million of the population, but it fell rapidly during the seventies, and has now practically disappeared from our bills of mortality.

A third disease common fifty years ago, although not showing the steady and rapid diminution of typhus, has at any rate during the last ten years been quite as negligible as a cause of death. I refer to smallpox, which in 1864 caused a mortality of 364 per million. At that time no part of public health work received so much attention as vaccination, and to the thoroughness with which vaccination was then and for long afterwards carried out we may justly attribute the great reduction in the prevalence and mortality from the disease which ensued. The slackening off in the law with regard to vaccination, which has been a feature of recent years, is I am sure viewed with considerable misgiving by most of us. At

the same time, having regard to the modifications which diseases appear to undergo in the course of time, I am not sure that it is wise to prophesy, as some do, the certainty of a terrible retribution for the increasing neglect of vaccination. To refer back to typhus for a moment, although that disease was one strikingly associated with privation and overcrowding, I am not at all satisfied that the improvements in the economic and housing conditions of the people have been in themselves sufficiently great and potent to account for the very marked reduction in the prevalence of the disease. It is more likely, indeed, that improved sanitation has acted as a powerful auxiliary to a natural tendency in the disease to die out—call it immunity or what you like—and it is just possible that vaccination has been working alongside and augmenting in the process of time a similar tendency in smallpox. Time, however, will show whether this is so or not.

Typhoid fever in 1869 had a mortality of 390 per million, the highest figure on record for this disease as a separate entity. It may have been said to have fallen steadily ever since that date, but with marked acceleration during the last few years. There is no disease, perhaps, to whose reduction one is so much inclined to give credit to improved sanitary conditions as typhoid fever. One would not, for example, be disposed to attribute quite so much to scarlet fever, but scarlet fever has shown the most marked reduction of all the infectious diseases, the mortality having fallen from 1,418 per million in 1864 to 54 in 1912, with a considerable acceleration of decline during the past few years.

Fifty years ago diphtheria was a disease coming into increasing prominence. For thirty years prior to 1857 it seems to have almost disappeared from the bills of mortality, but in 1864 diphtheria and croup (it is necessary to combine the two if we are to make the figures of that time and those of to-day at all comparable) accounted for a mortality of 585 per million, or something like five times the mortality of the present time.

The mortality from whooping cough fifty years ago was twice that of the present time, but the mortality from measles has shown very little abatement indeed. In 1864 measles caused a mortality of 397 per million, and in 1912 a mortality of 351. The administrative control of measles remains one of the most baffling problems which we as medical officers of health have to deal with.

Tuberculosis, which has shown an improved mortality to the extent of something like 60 per cent. during the past fifty years, is a more encouraging subject, and we may reasonably hope that the marked acceleration in reduced mortality which tuberculosis has evinced during the opening years of the present century will be continued, until the happy time arrives when a death from tuberculosis will be quite as rare as a death from typhus fever.

I have put before you a few bald facts to show the enormous mortality from infectious diseases fifty years ago. As a corollary we naturally expect the existence of gross insanitary conditions throughout the country at that time, and if we turn to the public health records of that day we will not be disappointed. Many of us working in the older industrial towns of the north are apt to get discouraged at times with the amount of insanitary conditions yet remaining in our areas, and with the slow progress we seem to be making in their removal. At such times I know of no better antidote than to look into the records of past years, and compare the condition of our town fifty years ago with what it is to-day. It may not be all we would like it to be to-day, probably a long way from that, but how infinitely better than it was fifty years ago! A few quotations from a report on the sanitary condition of Wakefield by Netten Radcliffe nearly fifty years ago will give some idea of what things were like at that date, for there is no reason to suppose that Wakefield was any worse than hundreds of other towns in the country. At that time Wakefield had only about a third of its present population, and the rate of mortality was about 30 per thousand. Here is a description of what Mr. Radcliffe found in a small yard off one of the principal streets:—

"The yard is a quadrangle entirely shut in excepting a narrow passage communicating with the street. It contains seven cottages, and in six of these there were cases of fever. Traversing the yard from right to left, and taking the cottages in the order in which they come, there were two cases of fever in the first; one case in the second; three cases, of which one died, in the third; two cases, one fatal, in the fourth; two in the fifth, and three in the sixth, making totals of thirteen cases and two deaths in the six cottages." He then goes on to describe the privy midden, untrapped openings into the drain, and the general insanitary condition of the yard. In another yard he found six cottages. "In each of the cellars of

* Presidential Address to the Yorkshire Branch of the Society of Medical Officers of Health, December 2nd, 1914.

the six cottages there were six to eight inches depth of water. This I was told by the inhabitants was the ordinary state of the cellars. With perverse ingenuity the proprietor has placed a pump at the extremity of the cottages nearest the street, by means of which the water can be pumped out of the cellars. But as to dry the cellars in this manner entails no small amount of labour upon the occupants of the cottages, the pump is rarely had recourse to. The yard is not drained opposite these cottages except by the surface, and even the arrangements for surface drainage are most defective. Stools and other liquid refuse lodge in an imperfect channel opposite the cottages, and there spread out into filthier puddles, not the less offensive and indicative of neglect that they have been partially hidden by boulders. Between the six cottages and the street intervene, in the succession given, sundry pigsties, a large middenstead at the level of the yard, with attached privy, a foul-smelling enclosure and outhouse joined to the slaughterhouse, then a lair and cart-shed combined, next another midden, with a series of four privies, three locked, one open and inexpressibly foul; a slaughterhouse follows, with a stable adjoining, and finally two cottages."

Later on in the report he refers to the privy middens, which he says "were, with one grand exception, simple brick enclosures, uncovered and without any provision to prevent soakage of the contents into the ground. All were arranged to contain several months' refuse." The large size of the receptacles was due, he says, to the fact that the duty of cleansing them was laid on the householders. He then describes the "grand exception" in the following words: "At the extremity of the yard, furthest from the entrance from the street, privies have been built with shallow pits, but they have never been used. They were disapproved of by the Local Board of Health and closed. In place of them, and with the approval of the Local Board of Health, the fifth cottage on the north side has been converted into a privy in the following manner: The entire front has been taken out and the upper chamber floor removed. Upon the stone flagged floor of the lower room a privy of four separate compartments has been erected, each compartment with a single aperture, corresponding with apertures in the floor below. The privy is arranged at right angles to the former front of the cottage, and behind the flooring has been cut away so as to give access

to the cellar beneath, converted by this arrangement into the privy pit and middenstead for the yard. Anything more wrong-headed and more revolting than this arrangement would be difficult to conceive."

The water supply of Wakefield fifty years ago was derived from the River Calder. "A third of a century ago," says Mr. Radcliffe, "the stream as it flowed under Wakefield Bridge was bright, sparkling, transparent, odourless and swarming with fish. Now the river is in fact the common sewer of Wakefield, and of numerous manufacturing towns and villages on or near its bank along its course above that town."

Although the water was treated in a subsidence reservoir and by filtration through carbide of iron and sand, "it is almost incredible," says Mr. Radcliffe, "that water having the history and presenting the aspect of that of the River Calder below Wakefield can under any circumstances be made fit for human consumption." Yet the River Calder remained the source of the town's water supply for twenty more years and up to 1888, when the present excellent supply was introduced.

The few illustrations which I have given you as to the gross insanitary conditions existing fifty years ago will no doubt suffice. If you wish more I will refer you to the Privy Council reports of the time, where the pages simply sparkle with the expressions "abominably filthy," "unspeakably foul," and so on.

Fifty years ago the local administration of public law was notoriously ineffective. This was due in part to the fact that the principal Act of a public health character—the Act of 1858—was an adoptive Act, and to the fact that there was often a sub-division of local authorities, who took more interest in quarrelling with each other than in removing the nuisances in their area. The provisions in the Public Health Acts of 1848 and 1858, as well as in many other Acts of the time, were many of them excellent, and if adequately enforced would have led to great sanitary improvements throughout the country. But the local machinery was mainly, so far as its real duties were concerned, in a state of chaotic inertia. What with Local Boards of Health, Improvement Commissioners, Boards of Guardians—what was everybody's business was nobody's. In one single backyard one authority might have to deal with the pigsty (which would likely be there) and another authority with the privy midden (which would certainly be there),

and that being the case both pigsty and privy would be left comfortably alone. A district could secure for itself a Local Board of Health by petitioning the Privy Council, or the Privy Council could direct the formation of a Local Board of Health if the death-rate of the district exceeded 23 per 1,000. That figure is very significant of the standard of the time, and whilst we may smile at it now, the law-makers of the earlier day evidently thought that a district which could keep its death-rate down to that level was in no special need of local governance. I wonder what the Friendly Societies would think of that standard now.

Local Boards of Health were required to appoint an inspector of nuisances, and might if it thought fit appoint a medical officer of health, but there was no compulsion in the matter of appointing a medical officer until 1872. I have no information as to what number of medical officers were in office fifty years ago, but there can be little doubt that the functions of most of those who were appointed would be mainly consultative in character.

I find that in the year 1854 the Wakefield Local Board authorised the inspector of nuisances, who himself had been appointed the year before, to call in the services of two medical men in the town when he deemed it necessary, and about ten years after that Dr. Wade, my immediate predecessor, was appointed the first medical officer of health. Although the appointment of inspectors of nuisances was compulsory from 1848 onwards in districts with Local Boards of Health, it would appear that in most cases their duties as public health officers were considered subsidiary to other duties, often a great many other duties, which they were called on to perform. For instance, the first inspector appointed in this town was the chief constable, and for his sanitary duties he received the princely salary of £15.

Sanitary inspection was, under the circumstances, generally carried out in a very perfunctory manner, and the lack of competent and informed guidance naturally left Local Boards of Health to jog along unconcernedly amidst the grossest insanitary conditions that can be conceived. Nor were they much troubled from headquarters. The central authority in public health matters was at that time the Privy Council, which had in 1858 taken over the medical duties of the General Board of Health, and which itself was superseded in 1871 by the Local Government Board. The only executive duties possessed by the Privy

Council were with regard to the administration of public vaccination and the putting into force the Diseases Prevention Act in case of formidable epidemics. Otherwise their sole duty was one of inquiry and report, and although they might make representations they had no real power over local bodies. Indeed vaccination was the only public health measure which at that time was being administered in anything like a thorough manner. But if both the central and local administration of public health law was feeble and inefficient, it must not be imagined that this was entirely a period of stagnation. It was indeed a great incubation period, which was in due course to bring forth the great Public Health Acts of 1872 and 1875. Great and far-seeing minds were then at work, and amidst many difficulties and in face of a strong opposition, kept pegging away at research on the one hand and at public agitation on the other. It is indeed due to pioneer work in these and in still earlier days that public health administration of this country came to be laid on a sure and scientific basis, and the rapid developments of recent years are the later fruits of seeds sown fifty, sixty, or seventy years ago, and by men whose names are now almost, but unpardonably, forgotten.

Fifty years ago the medical officer to the Privy Council was a man whose name should ever be writ large in the history of the public health of this country.

Born in 1816, and living on till 1904, John Simon was fortunately able to see the fruits of his long and enthusiastic labours in the interests of the public health. He had not the distinction of being the first medical officer of health in this country—that honour belongs to Dr. Duncan, of Liverpool—but he was the second, having been appointed medical officer to the City of London in 1848, just a year later than the Liverpool appointment. But he may truly be regarded as the father of medical officers of health, a father of whom his numerous professional progeny may well be proud. Simon was a surgeon and a pathologist to begin with, and his thorough knowledge of the pathology of his time is revealed throughout his voluminous reports. Indeed he continued to find time during his career as a Government medical officer to indulge in pathological research, and he was one of the first of English pathologists to confirm Villemin's experiments with regard to the inoculability of tubercle. And this suggests incidentally the importance, nay, the necessity, if our work in preventive

medicine is to be both sound and progressive, of keeping ourselves thoroughly cognisant of the pathological work of the day. Pathology, and even physiology for that matter (witness the brilliant work which has been done on the functions of the ductless glands), will ever suggest clues for practical developments in public health work, many perhaps outside the beaten track, and what is no less important will inform us as to many weaknesses in our administrative work, founded, as some of it is, on mere tradition and routine.

Simon was not only a medical pathologist, he was also a social pathologist; and so it seems to me must also be the efficient and successful medical officer of to-day. He has not only to study the human body in health and disease, but he has also to study the conditions of social life in health and disease, to note the interactions between man and his environment, and to found a sound policy of public health administration on a comprehensive knowledge of both. It was Simon's good fortune to possess such comprehensive knowledge, and it is our good fortune to have it embodied in that classic of public health literature, "English Sanitary Institutions." That book has been a revelation and a stimulus to many of us who have been brought up to a narrow professional view of public health endeavour. The same spirit is evinced in Simon's Reports to the Privy Council, which are by far the most interesting and suggestive public health reports which it has been my fortune to read—so scientific in form, so cautious and yet, when the occasion required it, so bold in statement (as the water companies learned to know), so thoroughly philosophic in tone, and always set out in a clear and stately English, by no means common in medical literature.

The burden of Simon's reports was "Filth." He wrote a long special report on "Filth," and the subject is ever cropping up in his reports. He was up against dirt in every shape and form, and ever preaching the gospel of cleanliness. That still remains, I venture to think, the primary and main duty of the medical officer of health. There are duties more fashionable and attractive than those of the glorified sanitary inspector—there is probably not one half so really beneficial to the health of the public.

Simon gathered under his wing many young medical men of promise, into whom he infused his own enthusiasm and high ideals, and several

of these continued to carry on the work when the passage of years compelled the master to lay it down. I need only mention Edward Ballard, who was then carrying on his researches into the circumstances of summer diarrhoea; Burdon Sanderson, who was working at the inoculability and development of tubercle; Buchanan, who was engaged in those investigations which led to the conclusion that the drying of the subsoil through works of sewerage was an important factor in lowering the mortality of phthisis. There were also Seaton, Thorne-Thorne, Power, Thudiclum, and Klein was just beginning his bacteriological work. Fifty years ago bacteriology, which has come to play such an important part in public health work, was in its almost inarticulate infancy. Pasteur was, however, then busy laying the foundations of the science in his studies of fermentation, and already Lister was beginning to turn Pasteur's discoveries to great practical account. There was, however, only one pathogenic bacterium known to science at that time, namely, the bacillus of anthrax, which Davaine had just discovered and given it the name by which it is still known. The complete demonstration of the causal relationship of the micro-organism to the disease was, however, not made until 1876, when Koch gave his first serious contribution to science.

Fifty years ago phthisis cases were treated on principles diametrically opposed to those of to-day, although as far back as 1840 Dr. George Boddington, of Sutton Coldfield, had enunciated in his essay on the "Treatment and Cure of Pulmonary Consumption on Principles Natural, Rational and Successful," the essential principles on which open-air treatment is to-day carried out with so much success. Boddington sums up his treatment in the following words, which might indeed have been taken from a recent work: "To live in and breathe freely the open air, without being deterred by the wind or the weather, is one important and essential remedy in arresting its progress. The cold is never too severe for the consumptive patient in this climate; the cooler the air which passes into the lungs the greater will be the benefit the patient will derive. The common hospital in a large town is the most unfit place imaginable for consumptive patients, and the treatment generally employed there very inefficient, arising from the inadequacy of the means at command."

Boddington put his principles into practice, and opened a small sanatorium, but so strongly

was he opposed and ridiculed by the medical profession that he had to give it up, and the place was afterwards converted, and appropriately, as no doubt the profession thought at the time, into a lunatic asylum. His principles afterwards received the strong support of Henry MacCormac, of Belfast, and Benjamin Ward Richardson, but years had to pass before they received the general approval of the profession in this country.

When speaking of the men who did so much to further public health work in this country it is not unfitting to mention, indeed it would be unfair to omit, the name of one who, although his life work was nearly finished fifty years ago, was then still alive and still keenly interested in the work he had helped so much to forward. I refer to Edwin Chadwick, who perhaps did more than any other single person in the last century to push forward the claims of sanitary science and to prepare the way for stronger and better legislation. As secretary to the Poor Law Commission, he had a special opportunity of learning the close connection between preventable disease and destitution, and starting from the point of view of the economist he became an ardent sanitarian.

As secretary to the Poor Law Commission, he was largely responsible for the preparation of a "General Report on the Sanitary Condition of the Labouring Population of Great Britain," which was issued in 1842, and formed the main basis for succeeding legislation, although some of its far-seeing recommendations remain yet to be embodied in public health law. Here, for instance, is a recommendation not yet fulfilled in its entirety although it was made over seventy years ago: "That for the prevention of the disease occasioned by defective ventilation, and other causes of impurity in places of work and other places where large numbers are assembled, and for the general promotion of the means necessary to prevent disease, that it would be a good economy to appoint a district medical officer, independent of private practice and with the securities of special qualifications and responsibilities, to initiate sanitary measures and reclaim the execution of the law."

Chadwick recognised clearly the imperative need of skilled investigation and expert advice in matters of the public health, and the fact that his advice was only tardily acknowledged explains in large measure the unsatisfactory condition of the public health fifty years ago.

I must now conclude this cursory sketch of the public health half a century ago. It is really unnecessary to point out what enormous advances have been made since that time both in legislation, administration, and what is of main importance, in results. The field of public health has broadened out greatly, and still continues to extend its domain. The extensions in the form of a direct public medical service, as exemplified in the medical inspection of school children and school clinics, in the establishment of schools for mothers and maternity centres, in the treatment of tuberculosis, are of special significance, and indicate not only a new, or at any rate a wider, conception of the public health service, but also, in all probability, a great, but I believe a strictly evolutionary, change in the general medical service of the public.

These newer developments impose, and will continue to impose, more and more great responsibilities on medical officers of health. Not the least of these responsibilities will be to wisely guide the enthusiasms of the public for sanitary reform into sound and scientific channels, for the need of agitating for such reforms, which has been a large part of our duty in the past, will no doubt be less and less required in the future. But we should recognise that a public enthusiasm has its dangers no less than a public apathy, and we should be on our guard lest we promise more from the public health service than it can adequately fulfil. It must be our business to see that first things are kept first, and to do that without neglecting any of the subsidiary helps to the advance of the public health. To my mind the first things are sanitary housing for the public and cleanliness—just the two things that Simon and Chadwick so much insisted on fifty and more years ago.

It is perhaps rather idle to speculate on the state of the public health fifty years hence. It would certainly demand an unwarrantable amount of optimism to imagine the land dotted with Cities of Hygeia, such as Benjamin Ward Richardson dreamt of forty years ago. Something has been done in these forty years towards the realisation of his dream, and no doubt a great deal more will be done in the next fifty, but the Cities of Hygeia, with their death-rate of 5 per 1,000, will assuredly be still a long way off. It has taken us 400 years to appreciate the idea of a Garden City, which Thomas More set out so aptly in his great book of the 16th century, but having grasped

the idea we may now possibly get on a great deal quicker. One thing, however, is certain: fifty years hence the housing conditions of to-day will be regarded as no less incredible than to us are some of the things which we are told existed in the middle of the last century. We cannot but view with satisfaction the great developments that are taking place in connection with municipal housing, not only as a direct means of providing sanitary houses for the working classes but as a means of facilitating the closure and demolition of the unsatisfactory houses that still so largely exist. It will also enable us to deal with the great evil of overcrowding, perhaps the worst feature of all connected with present-day housing conditions. Robert Louis Stevenson once spoke of the bedrooms of the poor as being the only malarial districts in this country. Unfortunately we have still too many such malarial districts in our midst.

Along with housing, I would put the campaign against dirt in the forefront of our programme. We must be out for cleanliness, cleanliness to a degree of fastidiousness, both municipal and personal. In these northern industrial towns of ours such a suggestion seems akin to a counsel of perfection, but none the less it is an ideal towards which we should steadfastly labour. After all, do not clean houses, clean courts and streets, clean drains and clean sewers, clean water and clean food, clean air and clean bodies represent the consummation of the sanitary ideal?

Tuberculosis will continue to engage a good deal of our attention, and while the best results will no doubt accrue in the future, as they have done in the past, from improvements in housing and sanitation generally, we may justifiably expect great assistance from the special efforts now being made to check the ravages of the disease. At no distant date we may expect to see the treatment of all cases of tuberculosis—pulmonary or otherwise—taken over by the sanitary authorities, provided as they will be with adequate sanatorium and hospital accommodation, farm colonies and open-air schools. In passing, I may say that I have no faith in the extravagant claims made by the advanced tuberculin school who denounce the expenditure on sanatoria as foolish and wasteful. In saying this I do not wish to deny the value of tuberculin, which is a remedy of considerable use, but it has its limitations and it also has its dangers, and as a substitute for the sanatorium it is not to be entertained for a moment.

With regard to infectious diseases, scarlet fever and typhoid fever will probably grow less and less important as time goes on. There is a great need of more knowledge with regard to the causation of diphtheria, and I look to the concerted work of the bacteriologist and the field observer for more light and guidance in this connection. Personally I am more and more inclined to regard epidemics of diphtheria as due mainly to certain meteorological conditions favouring the activity of the bacilli which we know are present in a not inconsiderable proportion of healthy throats, rather than to direct infection from case to case.

I am sure we would greatly advance our knowledge of epidemiology, and greatly strengthen our administrative control over infectious diseases, if every case of notified infectious disease was closely investigated by a medical officer, and not merely left, as is so often done, to the sanitary inspector, a practice which is a relic of the time when infectious disease and insanitary conditions were thought to be invariably associated. I am certain that systematic investigation by competent persons would do infinitely more to check the spread of infectious diseases than all the hospitals in the land.

We will also have to give more and more attention to the education of the public in the elementary but all-important principles of healthy living, and in this connection I would strongly urge the value of schools for mothers. For my part I know no educative agency half so effective and far reaching as a school for mothers which concentrates its energies on the young mothers of the community.

In conclusion I would like to emphasise the fact that our work as medical officers of health is only part of a great and ever-widening tendency towards social improvement, and if our own labours are to achieve the best results it behoves us to be always ready to intelligently and sympathetically co-operate with all agencies that are working for the good of the nation.

We must beware of the narrowing habit of what may be called mere "administrativeness" and the paralysing attitude of professional dogmatism, both of which have not seldom, I am sure, impaired the usefulness of our work. Let us always remember, as Sir John Simon wrote many years ago, "In every moral influence which elevates human life, in every conquest which is gained over ignorance and recklessness and crime, in every economical

teaching which gives better skill and wisdom as to the means of material self maintenance, in every judicious public or private organisation which affords kindly succour and sympathy to the otherwise helpless members of the community, the medical specialist gratefully recognises types of contribution often not less necessary than his own towards that great system of preventive medicine which is hoped for by sanitary reformers."

MILITARY APPOINTMENTS.

DR. FRAS. E. FREMANTLE, C.M.O.H., and S.M.O. of Hertfordshire, has been promoted to the temporary rank of Lieut.-Colonel in the R.A.M.C. (T.F.), as from the 14th Feb.

DR. A. GREENWOOD, the county medical officer of health of Kent, has been promoted from the rank of Major to a Lieut.-Colonelcy in the Sanitary Service, R.A.M.C.

DR. W. N. W. KENNEDY, assistant medical officer of health of Croydon, has received a commission in the 1st Batt. (City of London) Sanitary Corps.

DR. GEORGE S. LEVIS, assistant school medical officer and assistant tuberculosis officer to the Lindsey C.C., has been appointed Captain in the R.A.M.C.

DR. E. COLSTON WILLIAMS, county medical officer of health of Breconshire, has been appointed temporary Lieut., R.A.M.C., and is acting as Sanitary Officer of Witley Camp, Surrey.

CIVIL APPOINTMENTS.

DR. A. J. MALCOLM, one of the medical assistants in the Health Department of the London County Council, has been appointed medical officer in charge of the East End division, one of the five divisions into which London is divided for the purposes of the organisation of the work of medical inspection and treatment of school children.

DR. C. E. McDONALD has been appointed temporary medical officer of health of the Metropolitan Borough of Battersea during the absence of DR. G. Q. LENNANE on active service.

DR. JAMES McDONALD has been appointed medical officer of health of Wednesfield U.D.

DR. RORY E. McLAREN has been appointed county tuberculosis officer of Dorset.

DR. F. A. SHARPE, of Chesterfield, has been appointed medical officer of health of Barnsley.

DR. J. C. SMYTH has been appointed a clinical tuberculosis officer of the County of Hampshire.

DR. J. C. THOMSON, assistant medical officer of health of Dumfriesshire, has been appointed an assistant school medical officer under the Durham C.C.

DR. LEWIS A. WILLIAMS (the school medical officer) has been appointed assistant medical officer of health of the County Borough of Bradford.

LIST OF SUCCESSFUL CANDIDATES FOR THE D.P.H. AND DIPLOMA IN VETERINARY STATE MEDICINE, UNIVERSITY OF MANCHESTER:—The following gentlemen have obtained the Diploma in Public Health: T. F. Bamford, A. G. Bryce, D. I. Dakeyne, H. H. Proudfoot, D. M. Wilson.

The following gentleman has obtained the Diploma in Veterinary State Medicine: R. P. Holmes.

COLLABORATION BETWEEN THE MILITARY AND SANITARY AUTHORITIES.*

By S. G. MOSTYN, M.A., M.B., D.P.H., Medical Officer of Health and School Medical Officer of Darlington.

IN opening a discussion on the problems that the recent military situation has added to those already engaging the attention of medical officers of health, it would perhaps be simplest for me to recount my own experience at Darlington. These problems have been of great variety, and occasionally of considerable urgency, but willingness to co-operate, on the part of the military authorities and the civil authorities, always proved capable of dealing with them satisfactorily. At first the relation of the civil to the military authority seemed uncertain; but no difficulty arose on this account, as the military officers were always ready to make use of local knowledge which the borough sanitary staff possessed. Personally I was fortunate in having taken my holiday early this year as war was not declared until the last week that I was away. At the outbreak of the war we got ready for an immediate attack off our coasts by the enemy, but were uncertain on what lines this would take place. The question of greatest urgency was the provision of hospital accommodation for any wounded that might be sent to us in consequence of a naval engagement off the North East Coast. The local branch of the Red Cross Society had in some way obtained possession of one of the elementary schools and had turned it into a hospital. This action subsequently led to a good deal of not very intelligent discussion and criticism; I consider myself fortunate that I was not at home when this action was taken. After the war settled down and no raid had been made on our coasts, critics blamed the action of the Red Cross Society as hasty, in my opinion unfairly, as we had no reason at first to be sure that raids from the sea would form no part of the general programme; and we had not yet learned by experience to feel confidence in the opinions expressed by naval experts with regard to the impossibility of invasion, and the unlikelihood of a raid of any magnitude with the present condition of our Fleet. In one respect I do think there had been too great haste. No steps had been taken to find out the hospital resources already existing in the town. At the end of the first week in August I

* Read before the Northern Branch of the Society of Medical Officers of Health on December 18th, 1914.

made inquiries and found that including ninety beds arranged for by the Red Cross Society, Darlington had nearly three hundred beds which could have been used for wounded soldiers. Had all these been filled with acute cases the necessary medical attention would have severely taxed the medical men and nurses available to look after them. It would have been of no use to increase the number of beds when the necessary staff to attend to them could not be obtained. Since that time we have had in Darlington about one hundred sick and wounded nursed in the workhouse hospital, a building well suited for this purpose; thirty or more have been nursed in the Friends' Meeting House by the Red Cross Society, and from thirty to forty infectious cases from troops in the district have been treated in the Darlington fever hospital. I am glad to say that very few of these infectious cases came from troops billeted in Darlington.

At first we were a little nervous about the protection of our water supply, not indeed because we thought that the enemy would instruct any of their agents to pollute our reservoirs, but I feared that some misguided German might think that any harm done to our community was a help to his country. Soon after the outbreak of the war about five thousand men were encamped for training in two parks in the town. At first the Waterworks reservoirs which are near the town were guarded by civilians, but when the troops came here, a guard was provided by the military authorities. I have no reason to think that this guard was really necessary. Though the arrangements for billeting might have been better in some respects, there was not very much to complain of. The sanitary notions of the men were at first rudimentary, but they were soon taught better ways, and finally the camps were very well kept. Water pipes were laid down connected with the town's supply, but great difficulties were found in disposing of waste water. The subsoil in both camps was usually impervious and unless a field drain could be found, the collecting pits did not discharge themselves and had to be pumped out daily into carts. This work was done by the staff of the borough surveyor. Pigkeepers in the neighbourhood readily came to remove the swill from the camps. Their methods were crude and the receptacles they provided were unsatisfactory, but the supervision of the civil and the military sanitary staff produced great improvement. As soon as the camps were established I got

into touch with the officers in command, who expressed themselves very ready and willing to have visits from the sanitary inspectors to look over the camps and make suggestions of any improvements that could be carried out. The military authorities were helped greatly by the inspectors in this way, as the inspectors knew the resources of the town and were able to tell them where to get materials and appliances that were needed. The latrine accommodation in the camp furthest from the town consisted of shallow open trenches. These trenches were regularly cleared every day. In the camp nearer the town and on some smaller premises where troops were billeted galvanized iron receptacles were provided and a mixture of sand and disinfectant powder was provided by the borough surveyor to cover the deposits. These pans also were emptied every day. After the camp was removed, care was taken to fill in these trenches and to dig over the soil near by which was likely to be fouled by urine. Since the soldiers were shifted from their summer quarters new troops have been brought into the town. These are all billeted in halls or in public schools. These troops, who are now in winter quarters, are not packed so tight as was the case when the same schools and halls were used as temporary summer quarters in August. It is possible that in a short time all the elementary schools in the town may be used as billets for troops, and that school work will have to be postponed at any rate until the early summer. Just at present some of the schools are being used double time so that the teachers and children, whose schools are occupied by the troops, are accommodated at other schools. It will not be possible to provide accommodation for all the school children in halls or Sunday schools when the elementary schools are all used for troops, but an effort will be made to continue the education of the older scholars. I am glad to say that during the summer the camps were remarkably free from infectious disease. The only insanitary condition of importance was the existence of pediculosis vestimentorum in both camps. This is a trouble to which all encampments are liable, and the Darlington camps were no exception. It had got a firm hold before it was noticed, and the military medical officers at once took steps to deal with it. The troops infected were treated both at the workhouse and at the fever hospital. In the latter, fortunately, there was an empty ward available. By means of disinfecting

baths and by steam disinfection of the clothing and bedding one camp was entirely freed from this trouble, and the other was almost free when the camps were broken up. Since the troops have been billeted for the second time in the schools, there have been five or six cases of scarlet fever at one school. Want of spare room made it very difficult to carry out disinfection of the building affected, but I have reason to think that the energetic action of the medical officer in charge has been able to control the outbreak. A few cases of sore throat occurred in connexion with one of the battalions, but examination of swabs by the Northern Command Laboratory of the military hospital at York, shewed that they were free from diphtheria bacilli. Four of the men affected were isolated at the fever hospital until the results of the examination were known. No cases of typhoid fever have occurred among the troops in Darlington, but twenty-four cases from Bishop Auckland have been removed to Darlington for treatment in the fever hospital. This outbreak is at present being considered by a Local Government Board Inspector who came down to investigate it, and it seems likely that the cause of it was food pollution by an infected person among the troops. Half of these cases were considered ready for discharge last week, but examples of their faeces and urine examined at the Northern Command Laboratory, shewed that three of them still carried bacilli. These three have been retained and further specimens from them have been sent up for examination. I should like to have the opinion of the meeting as to what steps should be taken if negative results are not obtained in a short time from these men.

Returns of cases of infectious disease and of all houses where such cases are known to exist are made to the A.D.M.S., Newcastle. These houses are marked with large letters "S," "D," and "E" for scarlet fever, diphtheria, and enteric fever, respectively, and soldiers are informed that all houses thus marked are out of bounds.

Since August the sanitary authority has been given the names of all local contractors supplying the troops, and special attention is paid to their shops and warehouses, both with regard to cleanliness and with regard to the quality of the goods supplied.

The condition of the rooms where men are billeted varies, but on the whole it is very good. At first in some places there was a

difficulty in getting scrubbing brushes and cleaning materials owing to the army routine in such matters, but there has been an improvement lately. It must be remembered that many of these men are fresh recruits and have not yet learnt thoroughly the lessons of cleanliness, which it is to be hoped their army training will teach them. At first men were inclined to leave loaves of bread and other eatables on the floor beside their kit, but this is being stopped by the medical officers. It is possible that practices of this kind at Auckland were responsible for the typhoid outbreak to which I have referred.

Soon after the troops arrived in Darlington arrangements were made for the use by them of the public baths. Darlington fortunately has a big shower bath recently put in for the use of the school children. In this fifty children can wash at the same time. This bath has been greatly appreciated by the troops.

The billeting of the troops in the elementary schools seemed likely to put an end to all ordinary school medical inspection; I was very anxious that the work of the school clinic, which has only lately been opened in Darlington, should not be interfered with. In order that this work might go on, the medical inspection of the school children has been accelerated and modified, so as to get as large a number of school children requiring treatment on to our lists as possible. If the schools are closed after Christmas an attempt will be made to deal with cases of ringworm, defective teeth, defective eyesight, and minor ailments; and it is to be hoped that a large number of cases known to exist will be disposed of in this way. The Board of Education will, of course, not be surprised if the routine medical inspection of school children gets behindhand.

Even after receiving the Local Government Board circular in which medical officers of health were definitely instructed to co-operate with the military authorities it was not clear to me exactly where my duties and responsibilities ended. I have taken up the position that a medical officer of health is expected to know of the arrangements that are being made in his district, and to criticize and take steps to alter any methods that he may consider dangerous or unsatisfactory, but I do not consider that it is his duty to supervise the minor sanitation of camps, as they are all under the charge of the military medical officers; I have, however, thought it wise to let the sanitary inspectors pay frequent visits to all places where troops

are living, and I may remark incidentally that they have taken the same precautions where Belgian refugees are living, in both cases with excellent results; the responsible officers are only too glad to have this help. I should also like in conclusion to state that the whole of the staff of my health department including the fever hospital have shewn themselves ready to help in every way at any time both on week days and Sundays. Though the amount of additional work required in this way has been very large, it has not been necessary, except at the fever hospital where the number of patients has been greatly increased, to obtain any additional help. Everyone has done his or her best to help with this work, which, though quiet and out of sight of the public, is not one of the least important parts of the arrangements for carrying on the war.

DISCUSSION.

DR. CAMERON said he understood that it was in rural districts that the chief difficulties had arisen. In the county of Durham it had been necessary to put some pressure on the military authorities to secure proper attention to sanitary matters. He thought the system of filling up a latrine trench each day and making a new one would eventually lead to contamination of the whole of the surrounding ground. The practice of depositing all slops in a corner of a field was most unsatisfactory. In one instance within his knowledge, but not in this county, the place used for this purpose adjoined a reservoir, and it had been necessary to bring up to the camp a sewer, with which a large gully was connected, down which all slops were thrown. In another case the difficulty had been met by the provision of barrels for slop-water and pails in the latrines, which were emptied daily by a local contractor.

DR. TAYLOR said his experience of the military camps had not been a happy one. He had had in one camp about 5,000 troops in his district during the summer. In this camp he had found the latrine trenches placed at the highest part of a piece of sloping ground.

The trenches were six or seven feet deep. A little soil was thrown on each day, and when full the whole was covered in and left. They were satisfactory. The method of disposal of urine and waste water was very unsatisfactory, and resulted in a very considerable nuisance. In billets he had suggested that w.c.'s be provided at one or two places where the arrangements were most primitive, but these were objected to on the ground that they would become choked; but he thought that soldiers were not more likely to cause chokeage of w.c.'s than were civilians. W.c.'s were the proper conveniences for military

camps and billets. Objections to other necessary sanitary measures were made by the military because there was no nuisance *perceivable*. In one case, at a country house, there was some leakage from the cooking utensils, so a hole was dug in the kitchen floor, and the water allowed to collect in this, and periodically baled out with buckets. With regard to lice in clothing he had found ironing with a very hot iron efficacious.

DR. RENNEY said he had had little trouble in Sunderland. In most of the billets in his town the men were eating and sleeping in the same room, which was most undesirable. Owing to this the places could not be brushed out with water, and, as there were no tables, the men fed from the floor. Bread and similar articles of food were extremely likely to be contaminated.

DR. KERR said his experience was very similar to Dr. Mostyn's. In camps within the city boundaries he had taken steps to prevent latrine trenches being used, and had arranged for buckets instead. An arrangement was made for the troops to use the public baths in rotation. A large amount of disinfection of blankets and clothing had been done. Such disinfection seemed to be very important. The mixing of batches of blankets was no doubt the cause of the spread of lice. He had made a point of examining every billet before occupation. Some trouble had arisen with regard to overcrowding. He understood that 40 square feet per man was the minimum allowance by the War Office for billets, but he had not insisted on more than 25 square feet, as the higher number was practically impossible in Newcastle. He allowed privy pails where he could not get w.c.'s, more especially as he understood that most of the troops in the city would be put under canvas in the summer. In some of the billets he had had trouble from chokeage of w.c.'s. The standard for closet accommodation was 5 per cent., and the same for ablution basins. Ninety-six to ninety-eight of the men in most of the units in Newcastle had been inoculated against enteric fever. Diarrhoea had given rise to much trouble, chiefly in overcrowded or dirty billets. Food was often stored uncovered in a big room, which was swept out without sprinkling, and the eatables could not but become polluted, especially seeing the filth which the men trod into the room. He thought this was the cause in the outbreaks he had experienced. His authority had come to an agreement with the military authorities to take over all cases of infectious disease amongst troops in the Northern Division at a cost which covered working expenses. Special temporary pavilions for this purpose were being erected on a site adjoining the City Hospital, and would be completed shortly.

DR. HISLOP thought the main point was the disposal of refuse and excreta. Most of the troops in his district were billeted in public buildings or private houses. In the majority of cases w.c.'s were provided, but pails were allowed to supplement the permanent accommodation. The troops had access to the public baths, the men using a large spray before taking a bath. He had done a considerable amount of work in the supervision of contractors who supplied food to the troops.

DR. McLACHLAN said that until recently few men had been quartered in his district. About a month ago, however, about 6,000 men entered the town without the slightest warning. Every school was commandeered at a moment's notice. The billets were grossly overcrowded, but in the exceptional circumstances nothing could be done. The men slept and ate in the same room. There had been a considerable outbreak of scarlet fever amongst the troops. This originated in a man thought to have diphtheria. Bacteriological examination, however, proved negative, and the man returned to duty. Later he was found to be desquamating.

The closet accommodation, in addition to the w.c.'s, generally consisted of wooden erections with pails, which were emptied daily. Special pails were provided for urine. There were no public baths in this district, but in one billet the commanding officer had put up a bath for his men.

LIEUT. CLEGG said a pamphlet was being distributed by the Anti-Vaccination Society, advising the men not to submit to inoculation against enteric fever. He was having trouble with the men, who were being influenced by the pamphlet. Could the Branch take any action in the matter?

DR. MOSTYN, replying to the discussion, said that he did not understand at first that the medical officer of health had power to deal with billets, but Dr. Hill, the county medical officer of Durham, has informed him that this was the case even before the publication of the Local Government Board circular. The trenches in the camps were well looked after; where pans were provided a narrow plank was provided in front as a seat; this was kept well scrubbed, and the whole arrangement was in plain view, and had no hidden corners. No charge had been made for disinfection of blankets on account of lice, but the actual expense of doing this work amounted to about £1 a day. Thorough disinfection of rooms in the schools was difficult, owing to the construction of the buildings, and spray disinfection had to be used. Tables were now being provided for the men's meals. The spread of lice in the camps was due to the men using blankets in common, and also in one case to the guard tent becoming early infected. The regulation of floor space was 40 square feet per man, but in one case this had been diminished to as little as 18 square feet. The rule for the use of schools as billets was stated to be three men to ten children. Large placards against typhoid inoculation had been posted on the hoardings, but 90 per cent. of the troops had been inoculated before this. It was probable that the placards would do harm.

A COMPARATIVE STUDY OF TOWN AND COUNTRY WITH REGARD TO DEFECTS IN SCHOOL CHILDREN.

FROM the outset, school medical officers have found difficulty in turning to good account, often with inadequate clerical assistance, the vast mass of facts now accumulating from medical inspections. The Medical Officer to the Board of Education notices every year in his annual report certain useful studies, of greater or less statistical value, contained in the current local reports. This year (Report for 1912) he has suggested in his Appendix J an elaborate record of every defect in every child with a view to a comparison of summaries for different areas. The advantage of such summaries would, however, be very largely discounted by various inherent and uncertain differences between the several areas as regards climate, race and methods of record and observation. A carefully chosen selection of records for the elucidation of a specific problem may have a more precise value.

In his sixth annual report on the school-health of Hertfordshire, that for 1913, Mr. Fremantle gives the first quinquennial results of medical inspection in certain districts, selected and arranged so as to give a comparison, as nearly accurate as possible, between the physical defects of children in town and country. For this purpose he eliminates racial and climatic differences as far as possible by selecting for the comparison the four chief towns in the county and the rural districts surrounding them. Any personal differences of observation and record by the different medical inspectors are neutralised by the fact that in three out of four of the rural districts inspection is carried out by the same officers as in the corresponding towns, and in the fourth the difference is considered immaterial. The field of study consists of 18,201 children (out of some 70,000 inspected during these five years), 12,000 or so urban to 6,000 rural. A large table gives the number and percentage of 25 different defects separately for boys, girls and both, respectively in the urban and rural groups at each of three ages, 5, 7 and 12. The exact definition of each group, each age, each defect, and the method of recording in each case is also stated; while the chief figures are repeated and discussed in separate sections for each defect. We may allude to a few of the findings.

Heights and Weights.—Village boys have the advantage both in height and weight; but in the girls there is no difference, except that village girls in their twelfth year average 5 lbs. more than town girls. Comparative figures are given from other British inquiries. Mr. Greenwood's figures showed that the Hertfordshire children compare favourably with those of neighbouring counties.

and of England and Wales, except that their village boys weigh less than the average for the whole country; while their girls are more than 8 per cent. above the average in height. But Mr. Fremantle's figures show that the Hertfordshire children are not equal, either in height or weight, to those of the whole country, a fact he explains by the migration, especially to London, of successive generations of young men and women of best physique and general enterprise.

Clothing and Footgear.—Defects are nearly half as numerous again in the towns as in the villages, the difference being more marked at the older ages, especially in the boys. This is held to be a direct sign of urban poverty or carelessness; for the town girls, aged 12, are a conspicuous exception, owing probably to the better care they give to the mending of their clothes.

Nutrition.—One in every 14 children is found defective; and, with exceptions, in both sexes and at each age the defects in the towns are double those in the villages.

Cleanliness and Condition of Skin. As regards the head, defects are, except in the younger boys, more numerous in the villages, especially in girls aged 12 (31 per cent. in rural districts; 13 in urban). As regards the body the defects are two or three times as numerous in the towns as in the villages. But the proportions are lower now than in the earlier stages of the inquiry, owing to the system of school-nursing.

Teeth.—Rural considerably worse than urban, especially in girls at 7 and 12; girls are worse than boys; there is considerable improvement between the ages of 7 and 12, although dental treatment is obtained only with difficulty. It is pointed out that the prevention of dental caries at present rests on an uncertain basis; but some factor, perhaps dental treatment, has made a marked improvement in the urban figures since 1909.

Tonsils and Adenoids.—Both figures are worse for rural districts throughout, those for adenoids being twice as great in the rural as in the urban districts, with little difference between the sexes.

External Eye Diseases. The chief difference is at the age of 12, when both sexes suffer about twice as severely in the villages as in the towns.

Vision.—The proportion of defects per thousand, as between urban and rural, at the age of 7 is about 2 to 1 in either sex, whether for defects of one eye or of both. But at the age of 12 the difference is obliterated and in the case of the girls reversed. It is suggested that the constant focussing of the eye in the towns is responsible for the difference, which becomes obliterated or reversed at the higher age by the provision of spectacles and by better artificial lighting in town than in country. The defects are generally more numerous in the girls than in the boys, a fact

attributed to fine needlework in indifferent light, the difference being greatest in the villages.

Ear Disease and Hearing.—The difference between the figures in these two cases is of peculiar interest. In the rural districts the proportion of defects is fairly constant in each sex and at each age, both for ear disease and for hearing. But in the urban districts ear disease is only half as common as in the rural, while defects of hearing are twice as great. It is concluded that in rural districts deafness is the result of ear disease, while in urban districts it is mainly due to some other condition, perhaps of the auditory nerves and brain, either congenital or associated with the constant din of town life.

Tuberculosis.—Only 21 cases were discovered in these 18,000 children; and now that the dispensaries and visiting stations are at work, and cases are being far more frequently diagnosed, owing in no small degree to a lower standard of what constitutes tuberculosis, cases will certainly be recorded as more numerous in the towns, if only because of the new facilities there provided for diagnosis.

Vaccination.—Forty-three per cent. of these children showed defective or no marks of vaccination, 46 per cent. in towns, 36 in the villages. In the towns the boys, in the villages the girls are the less protected against smallpox. For every 8 primary vaccinations it is also recorded that there are now 9 "conscientious" exemptions.

Summing up of the Study.—The comparison, then, shows in favour of the rural children in respect of measurements, of clothing and footgear, of nutrition and cleanliness of the body, of vision, hearing and speech, of mental condition and of vaccination. The urban children show the fewer defects in respect of regularity of attendance, of clean heads, of teeth, tonsils, adenoids and cervical glands, ear disease, heart and circulation, infectious or contagious diseases and of little else. Their superiority in these matters the urban children probably owe to the resources of the towns, and especially to their more complete nursing arrangements.

In these directions improvement may be expected in the villages in the future, and with these exceptions the credit of the countryside for health is maintained.

Attention, however, must be called to the anomaly of the 12-year-old girl in the villages, who in most particulars has become more defective than her contemporary in the towns, whereas the boy of 12 in contrast still shows fewer defects in the villages on several of these points. The welfare of the 12-year-old girls in the villages is called in question.

Mr. Fremantle offers to send copies of his report to those who apply to him at the County Medical Office, Hertford. The report will repay careful study, and it is to be hoped that figures from other counties will be forthcoming before long for comparison with those of Hertfordshire, which at present hold the field in stating the relative conditions of children in town and country.

THE LATE SIR GEORGE TURNER, M.B., D.P.H., J.P.

ALTHOUGH it was generally known that Sir George Turner was suffering from a disease which sooner or later must prove fatal, his death, which occurred on March 12th, was not so soon anticipated.

Sir George Turner, the eldest child of George Turner, wholesale and retail silk mercer and linen draper, Queen Street, Portsea, and of Mary Silcock, his wife, was born on the 10th February, 1848, at No. 12, Chapel Row (now Admiralty Walk), Portsea.

At the age of eight years he was sent to school at Christchurch, Hampshire, to the Rev. Burrows,

resigned his appointments in Portsmouth to become medical officer of health of the combined sanitary districts of Herts. and Essex. He entered himself as a non-collegiate student at Cambridge in 1881, and took the M.B. degree.

He was appointed lecturer on hygiene at Guy's in 1882, and afterwards examiner for the diploma in public health for the University of Cambridge and the Conjoint Board.

In 1888 he married Eleanor Charlotte Silcock, the second daughter of Mr. Edward Clowes Silcock, of Chitisham, in the Isle of Ely. By her he had two sons, Michael Howard and Terence Watson.

In July, 1895, he was made medical officer of health of the Colony of the Cape of Good Hope,



THE LATE SIR GEORGE TURNER, M.B., D.P.H., J.P.

the vicar (the father of General George Burrows, who came to disaster at Maiwand), and subsequently to Dr. Behr, Hyde Abbey School, Winchester, and in 1863 to Paris to learn French, as a preparation for entering and carrying on his father's business, and to this end he was later on apprenticed to Messrs. Ford & King, of Bath, and to Messrs. Good & Gainsford, of the Borough.

He had, however, already strong inclinations towards medicine, and he found his business life altogether distasteful, so, with his father's sanction, he entered at Guy's Hospital in 1868.

He married Anne Silcock, the eldest daughter of the late Mr. Cubit Silcock, of Heacham, Norfolk, and by her had two sons, George Albert and Charles Philip. Having lost his wife, he

and went out to Cape Town. Rinderpest devastated South Africa in 1896-97-98, and in March, 1896, he succeeded Prof. Koch as director of the Rinderpest Experimental Station at Kimberley. By July, 1898, he had introduced a system of simultaneous inoculation of virus and serum with the most excellent results, and the disease was stamped out. The report on this subject was signed by him and his assistant, Dr. Kolle, and is now, especially in Germany, commonly spoken of as the Kolle-Turner method.

It was the intention of the then Minister of Agriculture to propose a vote of thanks in the Cape Parliament and to move for a grant of money in recognition of Dr. Turner's great services, which had resulted in the saving of millions of

money in South Africa alone, but the Ministry fell and nothing was done.

During the Boer War, 1899-1902, the army suffered heavily from enteric fever and dysentery. Dr. Turner, as medical officer of health, and having access to the death returns of the whole Colony, twice warned the military authorities that this would occur, and offered to go to the front. This offer was refused, but after the great mortality from enteric at Bloemfontein and elsewhere, Lord Roberts borrowed him from the Cape Government in July, 1900, and he went to Pretoria with his lordship as sanitary adviser.

Lord Milner offered him the position of medical officer of health of the Transvaal in 1901, and he accepted the offer.

Finding it impossible to obtain a suitable man to reside at the Pretoria Leper Asylum and attend to the lepers, he voluntarily undertook the work in his spare time.

Rinderpest recurred in South Africa in 1907, and Lord Kitchener directed Dr. Turner to institute a serum factory at Pretoria. The epizootic was stamped out in less than twelve months.

A Legislative Council for the Transvaal was instituted in 1903, and Dr. Turner was nominated a member by the Government.

A census of the Transvaal was taken in 1904, and in addition to his other duties he was made Commissioner of the Census. He was also Justice of the Peace for the Cape, Transvaal and Orange River Colonies.

At the age of 60, the service limit, he was retired and went to live at Auchencleck, Skene, Aberdeen, but in September, 1910, having discovered that he was a leper, he went to live at Colyton, Devon, to obtain the benefit of a warmer climate.

His Majesty conferred the honour of knighthood on him January 1st, 1913.

It is an illustration of his extraordinary energy and love of his profession that up to the time of his death he was busily engaged in medical work, writing a thesis on leprosy for his M.D. (Cantab), and keeping an accurate account of the symptoms of the disease as observed in himself.

The following is his own account of the discovery that he was a leper:—"On September 22nd, 1910, in the morning, as I was shaving in a good light with my arms bare, I saw some maculae with light fawn coloured centres and dusky borders on my left arm. This at once roused my attention, and it struck me that as I had incurred plenty of risk of infection I might in fact be a leper, and that I was going through the preliminary stage of leprosy. I have, therefore, to-day, 26th September, 1910, determined to keep careful notes of the signs and symptoms I may observe."

This record he faithfully kept, and on March 10th, 1915, two days before his death, he has

entered in pencil full notes of all the symptoms he experienced up to 10 p.m. on that date.

He was 67 years of age at his death, and leaves a widow and three sons. His eldest son has been chief medical officer of the Witwatersrand Native Labour Association, Johannesburg, for several years.

This is a brief account of George Turner's life and work, but there remains the need for a word or two on his personal characteristics. There are few men who spoke more directly the thoughts which are in their minds. His love of truth, his uncompromising contempt for everything that savoured of coquetting with wrong, manifested the loyalty of his nature. Firm and strong ally, he will be greatly missed by those to whom he gave his friendship. His latter days were marked by the same courage in facing his terrible malady as had characterized his life throughout. He set an example we should do well not to forget.

INSANITARY SHIPS.

THE total number of vessels that entered the port of Newport, Mon., during 1913 was 7,435, representing a tonnage of 3,629,094. The following comparative table shows the percentage of vessels found to be insanitary, and indicates their nationality:—

Nationality.	Percentage of vessels insanitary.		
	1898-1908.	1909-1912.	1913.
Denmark	10.5	15.8	9.3
Norway	11.11	16.1	26.6
Germany	11.27	17.8	15.7
Sweden	11.4	18.7	18.5
Austria and Hungary	13.27	24.3	33.3
Great Britain ..	13.99	15.6	16.0
Holland	18.3	17.1	16.1
France	18.5	21.8	13.4
Russia	19.5	27.6	41.7
Belgium	20.9	21.5	21.0
Portugal	22.59	60.4	33.3
Spain	26.2	22.0	28.3
Greece	29.8	23.7	58.6
Italy	32.7	29.5	42.6

It will be seen that the proportion of vessels which were found to have sanitary defects on board during 1913 was higher than during the period 1909-12. This is partly accounted for by the fact that the standard of hygiene is gradually being raised.

The crew spaces in several new vessels which have recently visited the port are, in many respects, very unsatisfactory owing to the fore-castles being curtailed in size in order to provide extra large hatches for loading and unloading. As the fore-castles are too small in such vessels for all the sailors and firemen, the forepeaks have been utilized for crew spaces. The crews occupying such antiquated dwellings have very aptly been described as troglodytes or cave dwellers.

The accommodation on another new vessel built in 1912, was designed on the old familiar lines, with the exception that the men's bunks were placed 'midships instead of against the vessels sides, but there were no messrooms, no washhouses or lavatories for the men, no provision for fixing windsails, although the vessel was built for trading in the tropics; the w.c.'s consisted of a compartment with two seats over a rough iron trough, with no automatic flush and with inadequate ventilation; there was a combined w.c. and bathroom for the officers and engineers.

A 17-year-old vessel which had recently changed ownership was in a neighbouring berth at the same time as the above new vessel. The new owner had forthwith altered the old-fashioned crew spaces and had provided quarters which were a vast improvement on the quarters provided on the new vessel referred to.

The usual reply to any criticism upon the crew spaces and sanitary arrangements generally on new vessels is that "the Board of Trade has passed them and certified them," owners and their superintendents naturally feel that such matters should have been pointed out by the Board of Trade at the time of building, as subsequent alterations for improving hygiene entail double expense.

A new type of motor-vessel which visited Newport in 1913, exhibited some flagrant evidences of a lack of ordinary intelligence on the part of the designer. The small cabin for the four greasers, which also was their messroom, contained a table 1 ft. by 1½ ft., so situated that one diner had to sit with his back against the radiator, another against the closed door, whilst the other two had to sit upon the edge of one of the lower bunks. The donkeymen's bunks were far too short to allow them to lie at full length in bed, and a heavy angle iron support was situated close above the head of the sleeper. There was no place of any kind for storing food, which consequently had to be kept in the wash-hand basin or below it.

The fore berth cabin for the quartermasters and petty officers was 7 ft. 6 in. long, two feet at each end being occupied by berths, with a free space of 3 ft. 6 in. in the centre by 6 ft. 6 in.—the width of the cabin. The cubic capacity after deducting the space occupied by fixtures was 300 cubic feet, or 70 cubic feet per head. This cabin served as bedroom, messroom, box room and living room. There was no space available for seats. These instances are merely mentioned in order to show that there is something radically wrong in the present system of supervising the building of new vessels in this country. It is quite evident that many owners are willing and even anxious to provide bright and healthy quarters for their

employees, but unless the shipbuilders or superintendents are given definite instructions in the matter, the old type of quarters are provided with little or no improvement. It is an unfortunate fact that reforms in the housing of crew spaces is spasmodic and that it depends upon the action of individual shipowners.

As an instance of the action of a shipowner in this respect the s.s. D.....m of London may be referred to. The entire fore-castle is utilised for firemen's quarters, with messroom with food lockers in forward part of the fore-castle, and sleeping quarters in the aft portion of the fore-castle extending the full width of the vessel, and ventilated by the ports and four ventilators in each room, the bunks being arranged amidships. Wash-house, and pedestal closets with automatic flushes, bath room with hot and cold shower baths, electric light, and bull's eye deck lights are also provided forward. The whole of the poop is utilised for seamen's quarters, including a large messroom with lockers, skylight, and large deck ventilators, a special room for hanging and drying clothes, bath with hot and cold spray, wash-house, and sanitary arrangements of modern type; capacious and well ventilated and lighted two berthed cabins, for sleeping quarters.

The crew spaces provided by some shipowners are excellent and far in advance of the requirements and even of the recommendations of the Board of Trade. For instance, in the newer vessels built for a Liverpool firm, the crews are housed in the poops aft in two berth cabins, each of which is provided with a steam radiator, chest of drawers, and good light and ventilation. Separate messrooms and bathing places are also provided and pedestal closets. A boy's services are also provided for the daily cleansing of the crew spaces. I was informed that one new vessel had completed several long voyages without a single change in the personnel of the crew, and that a bonus was given to the men for each year's completed service.

On the other hand, many vessels which have recently been certified by the Board of Trade contravene their regulations in many respects. Similar cases have been referred to in various reports.

The plans of new vessels, including details of crews' spaces, should be submitted to, and approved by, a responsible authority with a thorough knowledge of marine hygiene, previous to the building of vessels; and such plans should not be departed from without official sanction. This is compulsory in reference to a small cottage. It is at least equally necessary when dealing with the living and sleeping quarters of the British Mercantile Marine Service, which employs nearly a quarter of a million of men.—Dr. J. Howard Jones, *Annual Report, 1913, Newport Port Sanitary Authority.*

REVIEWS.

THE ANNUAL REPORT OF THE CHIEF MEDICAL OFFICER OF THE BOARD OF EDUCATION FOR 1913.

The dominant feature of this, the sixth report of the chief of the medical department, is the emphasis laid on the control of treatment and personal hygiene. Special attention is given to schools for mothers, and the greater importance of the preventive than of the curative side of their activities duly appreciated. Grants in aid of their educational functions are to be obtained from the Board, under whose inspection they will come in this respect, while their clinical activities, if any, are surveyed by a separate Government department. The question of the preservation of the rising generation is of more than ordinary importance, so that education must begin even in the pre-natal period, and must follow the child to the threshold of the industrial world, when it can hand over its care to another State department—the Insurance Commission. The report claims that the work of the School Medical Service is reaping its reward in its tangible effects in the actual well-being of the children. As is pointed out, a national scheme of child welfare needs time for its development, and cannot rightly be judged by any other result than the growth of a strong and healthy race of children. There is much to justify this claim, and the result is so important to the nation that all controlling agencies working in this direction should be correlated for the sake of national efficiency, and, indeed, of national existence. If multiple control is found to check the rapidity of an advance in physical and social well-being steps must be taken to secure unification.

The notes on the condition of school children are necessarily derived from the reports of the school medical officers of all areas of the country, are little more than a summary with tabular statements, which must be used with care and discretion, and represent only an approximation to accuracy. Some steps to secure greater uniformity will be beneficial if it is to be worth while to continue to issue tabular statements at all. When the percentage frequency of phthisis in school children can be given as 2.5 in Worcestershire and as 0.2 and 0.01 in the adjacent counties of Staffordshire and Gloucestershire respectively, and when the percentage frequency of dull and backward children can range in the county districts from 0.1 to 13.5 and in the towns from 0.2 to 24.1, it is clear that no recognised clinical or educational standards are at present being followed. The table of percentages of visual acuities shews that the variation of conditions under which the examination is made must be such as to render doubtful the expression of the differences in terms of Snellen's type. Several reports deal with tonsils and

adenoids, the subject suggested for combined research in 1915, but it would be interesting to know the evidence which leads one school medical officer to conclude that the presence of enlarged tonsils and adenoids leads to the blood not being properly oxygenated.

In view of the provisions of the Mental Deficiency Act, 1913, and the Elementary Education (Defective and Epileptic Children) Act, 1914, special attention is given to the topic of the mentally abnormal child. The compulsory character of these Acts will lead to a more complete knowledge of the numbers and defects of such children, but difficulties may be expected to arise in the administration of the Acts, particularly since the consent of the parent has to be obtained if a school is not within reach of the child's residence, and that a *bona-fide* intention of benefitting the child is to be taken as a reasonable ground for withholding such consent. It is stated that a complete system for mentally abnormal children must include—firstly, day schools or classes: (a) for dull and backward children, and for some doubtful cases of mental defect requiring further observation (it is not clear if it is suggested that these should receive special grants and so constitute the special clearing house school referred to in previous reports); (b) for children who are definitely ascertained to be educable feeble-minded, including severe cases admitted on probation. Secondly, suitably graded residential schools, and thirdly, colonies for elder defectives and for industrial training. Mentally deficient children are classified in the Act of 1913 as feeble-minded, imbeciles and idiots. If this be applied to the Acts of 1899 and 1914 it may give rise to difficulties, for there are children ineducable in the ordinary school sense who are not imbeciles, and others who are not incapable by reason of mental defect of benefitting by education in a special school, and who might in time improve sufficiently to return to the ordinary schools. Such children under the definitions of the Mental Deficiency Act are not feeble-minded. If the special schools are to be confined to class b above, there will be a distinct stiffening of the conditions of admission, and also a diminution of the class of child which in the past has derived permanent benefit therefrom. Unless schools of type a are established this will inflict a distinct loss on a class greatly in need of help. The problem of after-care is stated, and rightly, to call for the earnest attention of all concerned if substantial benefits are to be obtained from the new Acts.

Steady progress is reported in the direction of the establishment of open-air schools and schools of recovery, while the arrangements for dealing with tuberculosis have rendered valuable help to the suffering younger members of the community. In connection with the Provision of Meals Acts it is pointed out that much more medical inspection

will be required, and greater supervision will be exercised in the future, and attention is again drawn to the extreme importance of co-ordinating the arrangements for providing meals with the work of the School Medical Service.

A special section deals with the problems of adolescence and the linking up of school work with that of State Insurance and the National Services. As Sir George Newman points out, some gaps remain to be filled up before we can expect to get consistent results and permanent improvement in the physical life of the people. Such provision as exists has come into being almost haphazard and not as parts of a connected and coherent whole. Yet until there is a complete and comprehensive care throughout of the youth of the country we are not building wisely or well. On the details we may all disagree to the principle almost all will echo amen.

A TEXT-BOOK OF BACTERIOLOGY. By Professor E. O. Jordan. 4th Edition, 1914. 8vo. pp. 647, illustrated, cloth 13/- net. W. B. Saunders Co.

The growth of bacteriology is so rapid and is spread over so large a field that the writer of a text-book upon this subject has a difficult task if he seeks to cover all the domain and yet produce a book of moderate proportions. In this task the author has been eminently successful, and although the first edition was published in 1908 this, the fourth, only contains an additional 90 pages, while a great deal of fresh matter has been added, including several new chapters.

Professor Jordan in his preface modestly calls it a general introduction to the subject with some regard for perspective, and with emphasis on general rather than on special questions. It is much more than an introduction, as many subjects are treated in considerable detail, but the most salient character of the book is undoubtedly its breadth of treatment rather than its depth and its careful and judicious selection of material.

It is not a laboratory text-book, and laboratory details occupy far less space than in most general bacteriology books of its size. In this respect it is inferior to several of the English text-books, and for practical work would have to be supplemented by a laboratory manual if the services of a trained laboratory teacher are not available.

As an illustration of its inadequacy in this direction may be mentioned the treatment of the acid fast bacilli, other than the tubercle and leprosy bacilli. Although nearly two pages are devoted, and their importance and significance is clearly set out, no detailed description is given of their cultural characters or the laboratory methods to be used for their identification.

Compared with other text-books on its subject the book is evidently written less from the standpoint of the pathologist, who regards bacteriology

as a sub-division and subordinate part of his subject, and more from that of the bacteriologist pure and simple, especially one who is conversant with its close relationship to the science of public health.

This point of view, combined with its clearness of statement and breadth of treatment, makes it an admirable volume for the medical officer of health and medical man who wishes to obtain a broad, accurate and up-to-date knowledge of bacteriology, and for this purpose it may be very strongly recommended.

In arrangement the usual lines are more or less followed. The earlier chapters deal with laboratory methods, methods of development and growth, effects of physical and chemical agents upon bacteria, and the classification of bacteria.

The chapter on immunity is very readable but short, and is only an introduction to this vitally important but complex subject.

The main portion of the book is occupied by chapters dealing with the different pathogenic bacteria, while separate chapters deal with yeasts, moulds and pathogenic protozoa.

The wide scope of the book is shown by the separate chapters upon bacteria in the arts and industries, bacteria and the nitrogen cycles, the filterable viruses, the bacterial diseases of plants, and (in an appendix) infectious diseases of unknown causation. These chapters are of great interest, and furnish an up-to-date summary of matters which are not readily accessible, being largely buried in the form of the original papers in the journals and reviews.

The bacteriology of milk and milk products, and of air, soil and water are considered in two chapters, and in greater detail than in most general text-books on bacteriology. While the general account gives much information, the laboratory descriptions for the examination of these substances are quite inadequate for practical working purposes.

The text supplies an immense amount of information from all sources, American work, as may be expected, being very extensively made use of. Of outside influences, that of Germany is rather more in evidence than that of England.

In one or two directions English work has hardly been given the credit and prominence it deserves. Two examples may be mentioned. The work of the English Royal Commission on Tuberculosis is, it is true, referred to, but only extremely briefly, and the valuable additions which have resulted to our knowledge are insufficiently recognized. The protective inoculation method against typhoid fever is discussed, but no mention is made of the work of Sir Almroth Wright or Sir William Leishman.

As far as we have been able to test it we have found it accurate, except that in the chapter on

the *Bacillus Enteritidis* group the method of classification given is not generally accepted, and indeed is certainly incorrect. In England most bacteriologists recognize three groups, represented by *B. enteritidis*, *B. paratyphosus B.*, and *B. suipestifer*, while in Germany the commonly accepted view is one of two groups, the last two being considered identical. Professor Jordan groups the first two as identical, leaving *B. suipestifer* as the second group, including in it the *B. aertrychii* and other food poisoning strains.

In the chapter on diphtheria the author follows the generally accepted view that bacillus of Hofmann and other pseudo-diphtheria bacilli are distinct from the true diphtheria bacillus. He draws attention to the value in public health administration of bacterial swabs from the throat, but omits to mention the equal importance of swabs from the nose.

These are, however, but minor points, and do not seriously detract from the value of this important work. That a fourth edition has been required is a well-deserved tribute to its merits.

HUMAN DERELICTS. Edited by T. N. Kelynack, M.B. pp. 341. Price —. London. Charles H. Kelly, 26, Paternoster Row, E.C., 1914.

Although from the standpoint of the medical reader this is a semi-popular work, it is one of special interest and value to the medical officer of health as containing a summary of the conclusions of many experts upon the lines on which prevention and remedy must proceed in order to reduce this wreckage upon the ocean of life. "Human Derelicts" aims at being a scientific and serviceable contribution to social pathology, preventive medicine, and constructive philanthropy. It consists of a collection of communications by medical experts, and deals with those classes of defectives, delinquents, and dependents to which belong the largest number of such derelicts. The aim of the work is to provide social workers with a concise and reliable presentation in non-technical language of such essential facts, guiding principles, and effective practices as are likely to be of assistance in the study and solution of those social problems which are directly related to the chief sections of morbid mankind. In order to make the work as helpful as possible to serious students and practical servants of the people, references have been appended to each chapter. An excellently written foreword is contributed by Sir Thomas Clouston, in which he states that it would be an under-estimate to say that there are a million derelicts of various kinds in Great Britain, even if one does not touch the borderland—that twilight where brain light and darkness, social fitness and unfitness, merge into each other.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856.

RECONSTRUCTED 1888.

INCORPORATED 1892.

AN Ordinary Meeting of the Society was held at the Offices of the Society, No. 1, Upper Montague Street, Russell Square, London, W.C., on Friday, March 12th, 1915, at 5 p.m. *Present:* Dr. Herbert Jones, President (in the chair), and Drs. W. G. Willoughby, W. A. Berry, Charles Porter, T. Orr, B. C. Stevens, George H. Dupont, C. Rolleston, W. Benton, H. A. Hall, H. W. Harding, J. T. C. Nash, F. C. Linton, James J. Paterson, S. C. Lawrence, C. Sanders, W. A. Bond, Joseph Cates, R. Veitch Clark, T. W. N. Barlow, T. Shadick Higgins, R. Haldane Cook (Associate), and William Thomson, Esq. (Associate).

Minutes.—The minutes of the previous ordinary meeting, held on Friday, February 12th, 1915 (*vide* PUBLIC HEALTH, March, 1915, page 150), were taken as read, were approved and duly signed by the Chairman.

Correspondence.—DR. T. W. NAYLOR BARLOW (hon. secretary) said he had received from Dr. T. Ridley Bailey a letter regretting inability to attend the meeting.

The Late Edward Cox Seaton, M.D., F.R.C.P., F.I.C.—The PRESIDENT said that before they began their ordinary proceedings he wished, on behalf of the Society, to make some reference to the loss which they and the whole of the Public Health Service had sustained since their last meeting in the death of one of their oldest Honorary Fellows, Dr. Edward Cox Seaton. Dr. Seaton belonged to an older school than some of those present. To the younger members of the Society he was not so well known, and it might indeed not be known to all how very loyal and strong a supporter of the Society Dr. Seaton had been. He was the first President of the Home Counties Branch, and afterwards President of the Society itself. When Dr. Seaton left the Presidential Chair he continued to maintain an active interest in the Society. He was a very regular attendant at their ordinary meetings up to within recent years, and his wise counsel was helpful on many occasions. He (the President) formally moved from the chair that the Hon. Secretary be asked to write a letter of condolence to Mrs. Seaton, expressing the sympathy of the Society with her in her bereavement, and referring to the great loss the Fellows had sustained by his death.

DR. CHARLES SANDERS (hon. treasurer) said that, as one of the oldest members of the Home Counties Branch, he wished to associate himself with the vote so ably moved by the President.

They of the Home Counties Branch were in a position to venerate the memory of Dr. Seaton. On account of illness their distinguished friend had been unable to attend their proceedings so frequently of late years, but it might be said that the meetings at which he was present were considered red letter days, for no matter how obtruse or difficult the subjects bearing on matters of public health which came up for discussion, they were always ably treated by Dr. Seaton. He most cordially seconded the vote moved by the President.

The motion was carried in silence, the Fellows rising from their seats.

Nominations for Election.—Several nominations for election to the Fellowship of the Society were submitted.

DR. W. G. WILLOUGHBY then read a paper entitled "Notes on the Etiology of Diphtheria from the experience of 1,500 cases,"* and a discussion took place, in which the following members joined, viz.: The President and Drs. J. T. C. Nash, J. J. Paterson, H. W. Harding, R. Veitch Clark, B. C. Stevens, Sidney C. Lawrence, Charles Porter, Charles Sanders, T. Orr, T. W. Naylor Barlow, and A. M. Erskine.

Dr. Willoughby replied, and the meeting adjourned.

Southern Branch.—A meeting was held at 1, East Park Terrace, Southampton, on Friday, February 5th, 1915, at 2.30 p.m. There were present:—Dr. Lauder (in the chair), Drs. C. W. Hutt, C. J. Galbraith, E. A. Wilkes, A. T. Troup, Lockhart Livingstone, R. A. Lyster, James C. Hoyle, A. Ashkenny, Gilbert Elliott, Lockhart Stephens, J. P. Walker, James Fenton, R. Bartlett, H. L. Hamilton, A. Mearns Fraser (acting hon. sec.).

The minutes of the last meeting were read and confirmed.

Apologies for absence were announced from Dr. Legate (the President), Drs. Willoughby, Nankivell, McLaren, and Forbes.

The Acting Hon. Secretary announced that at the last meeting of the Council of the Society in London the resolution passed by the Southern Branch at its meeting in May last was approved, and it had been decided to take any steps deemed advisable to effect the furtherance of the object of the resolution. The resolution in question recommended that local sanitary authorities should be given the same powers in regard to the sanitary supervision of factories that they have in regard to workshops.

The Acting Hon. Secretary read a letter from the Hon. Secretary of the Society which stated that the Branch had the right to nominate a

*To be published in a subsequent number.

Fellow of the Society as President for the coming Session 1915-1916. It was proposed by DR. LYSTER, seconded by DR. WALKER, and resolved that Dr. Eustace Hill be nominated by the Southern Branch as President of the Society for the next session.

Owing to no meeting of the sub-committee, appointed in connection with the proposed division of the Branch, having been held, the consideration of the sub-committee's report was adjourned to the next meeting of the Branch.

A communication from the Parent Society enclosing a copy of the reference from the Departmental Committee on Building By-laws was considered. The discussion on the subject was opened by the chairman (Dr. Lauder) and taken part in, amongst others, by Dr. Hoyle, who thought that existing by-laws were not sufficiently elastic; by Dr. Livingstone, who spoke as to the use of chalk in the construction of the walls of cottages which in practice had been found dry and satisfactory; by Dr. Bartlett, who was of opinion that present rural building by-laws did not have a restricting effect on building; by Dr. Hutt, who expressed the opinion that in some respects, notably in regard to requiring proper provision for the storage of food, existing by-laws were not sufficiently stringent; by Dr. Lyster, who considered that by-laws were of a too rigid and cast iron character, and did not take sufficient cognisance of various local conditions existing in different localities—he stated that building by-laws had had the effect of restricting building operations in a district in Hampshire; he also spoke in favour of allowing mud cottages and wooden cottages to be erected; Dr. Wilkes spoke in favour of the erection of wooden cottages; Dr. Walker expressed the opinion that in developing building estates it would greatly assist in the provision of cheaper houses for the working-classes if a large part of the cost of the provision of the new roads was borne by the local authority and not by the builder or the owners of the houses.

The discussion was principally limited to building by-laws in their relation to rural districts. Finally, it was proposed by DR. LYSTER, seconded by DR. LIVINGSTONE, and resolved: "That in the opinion of this Branch there is need for increased elasticity as regards the building materials permitted (under by-laws) to be used in the construction of houses."

It was resolved that the next meeting of the Branch be held at Southampton. At the end of the meeting Dr. Lauder very kindly entertained the members to tea.

North-Western Branch.—The monthly meeting was held on February 19th, at 3.30 p.m., in the Grosvenor Hotel, Manchester. Present:—The President (Dr. Mussen) in the chair, Drs.

J. W. Talent, T. W. H. Garstang, R. Sydney Marsden, E. Sergeant, W. Allen Daley, H. Peck, T. W. N. Barlow, J. Wheatley, C. L. Corbett, J. A. Harris, F. J. Wheeldon, J. Wood, W. St. C. McClure, C. Berry, C. Banks, W. F. Dearden, F. Webb, and H. H. I. Hitchon. Apologies for absence were read from Drs. Cates, Jessel and the Honorary Secretary.

The minutes of the previous meeting were read and confirmed. DR. SERGEANT proposed, the PRESIDENT seconded, and it was resolved:—"That the Branch send a letter of condolence to the widow and family of the late Dr. Burnet, medical officer of health of Cornwall and late of Bury."

PRESENTATION TO DR. BARLOW.—The President, in a very happy and felicitous speech, presented to Dr. Barlow, on behalf of the Branch, an electric standard lamp and a piece of silver, as small tokens of the appreciation which the members of the Branch felt for his services as Honorary Secretary from 1907 to 1914.

DR. SERGEANT warmly eulogised Dr. Barlow's work for the Branch, after which Dr. Barlow expressed his thanks to the members for their kind gift.

DR. TALENT then read his interesting paper on "The Filtration of Drinking Water," and in the subsequent discussion the President, Drs. Sergeant, Wheatley, Peck and Garstang took part. A vote of thanks was passed to Dr. Talent for his paper, to which he replied.

Resolutions were passed with reference to the Nominations for the Presidency of the Society in 1916, and also with reference to the work of medical officers of health under the Mental Deficiency Act.

Yorkshire Branch.—A meeting was held at the Sanitary Offices, Leeds, on Friday, January 22nd, 1915, and was presided over by Dr. Gibson. The other members present were Drs. Angus, Burman, Halliwell, Hicks, Pearce, Smith, and Wiltshire.

After the minutes of the previous meeting had been read, DR. J. ASPINALL MARSDEN, the medical officer of health for the Shelf and Hipperholme urban districts, read a paper on "Lead Poisoning in Relation to Public Water Supplies," and an interesting discussion followed.

The next item on the agenda paper was a discussion on the building byelaws, arising out of a communication from the Departmental Committee on Building Byelaws to the Central Society, which had been referred to the Branches. The question had been postponed from the December meeting of the Branch, and the openers were Drs. Burman, Halliwell, and Wiltshire, whose remarks, centred chiefly on the point as to whether any relaxation of the byelaws was advisable from the standpoint of the medical

officer of health, led to a very lively debate. The feeling of the meeting was embodied in the following resolution:—

That this Branch cannot recommend any material relaxation of the Model Building Byelaws so far as they relate to the actual construction of houses and drainage. The Branch, however, suggests that economies might be secured in connection with matters outside the dwelling, *e.g.*, in the construction of streets, cost of sewerage, in the substitution of cheaper materials for boundary walls between gardens or backyards, in the avoidance of back roads where feasible.

Northern Branch.—A meeting was held in Dr. Kerr's Office, Town Hall, Newcastle-upon-Tyne, on December 16th, 1914. *Present:* The President (Dr. J. W. Smith), Drs. Mostyn, Renney, MacLachlan, Cameron, Taylor, Kerr, Hislop, Fyfe, and Lieut. S. J. Clegg.

DR. MOSTYN opened the discussion on "Collaboration between the Military and Sanitary Authorities" (*published in the present issue*). Drs. Cameron, Renney, Taylor, Kerr, and Hislop also took part in the discussion, and Dr. Mostyn replied.

Midland Branch.—The last meeting was held at the Council House, Birmingham, on Thursday, March 4th, 1915, at 3.30 p.m. *Present:* Dr. J. M. Cowie (in the chair), Drs. W. M. Clendinnen, Dryburgh Gold, F. T. H. Wood, W. H. Davison, R. Woolsey Stocks, H. Gibbons Ward, J. W. Miller, G. Petgrave Johnson, T. Ridley Bailey, A. Bostock Hill, Henry Malet, Philip Boobyyer, J. Orr, and E. H. Snell. Apologies for absence were received from Drs. Henry May, Henry Handford, and Doig McCrindle.

DR. ORR read a paper on "Are Definite Standards Possible in the Production and Sale of Milk?" This was discussed by Drs. Bostock Hill, P. Boobyyer, J. W. Miller, Dryburgh Gold, Clendinnen, and Dr. Orr briefly replied.

LAW REPORTS.

COURT OF APPEAL.

January 13th, 1914.

BEFORE BUCKLEY, KENNEDY, AND PICKFORD, L.JJ.
WEST RIDING OF YORKSHIRE RIVERS BOARD *v.*
LINTHWAITE URBAN DISTRICT COUNCIL.
River Pollution—Sewer Vested in Sanitary Authority—Liability to Proceedings.

An urban sanitary authority which permits polluted liquids to fall into a stream through a sewer vested in them are liable to proceedings under the Rivers Pollution Act, 1876, at the instance of another body having the powers and duties of a sanitary authority to enforce that Act.

This was an appeal from a Divisional Court. The plaintiff board had taken proceedings against the defendant council under sect. 4 of the Rivers

Pollution Prevention Act, 1876, for knowingly permitting to fall or flow into the River Colne polluting liquids from factories in the district. The County Court judge who heard the case held that the defendant council had committed an offence. The council appealed, and contended before the Divisional Court that proceedings could not be taken against them at all by reason of sect. 6 of the Act. That section provided that "proceedings shall not be taken against any person under this part of this Act save by a sanitary authority." The Divisional Court upheld this contention, and reversed the County Court judge. The Court allowed the appeal.

BUCKLEY, L.J., said the plaintiffs were a statutory body in whom had been vested the powers and duties of a sanitary authority to enforce the provisions of the Rivers Pollution Prevention Act, 1876. The question was whether the defendant council could be sued at all. The Divisional Court had held that they could not, but sect. 8 of the Act had apparently been overlooked, and no argument had been addressed to the Court on that section. It was quite plain that that section allowed one sanitary authority to take proceedings against another. He therefore thought that it was clear that the defendant council were proper parties to the proceedings.

KENNEDY and PICKFORD, L.JJ., delivered judgments to a like effect.

HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.

BEFORE RIDLEY, AVORY AND LUSH, JJ.

November 26th, 1914.

HAYNES *v.* DAVIS.

Sale of Food and Drugs Acts—Omission to Serve Analyst's Certificate with Summons—Summons Dismissed—Second Summons.

If a summons for selling milk to the prejudice of the purchase is dismissed because no copy of the certificate of the analysis is sent with it, a second summons with such copy certificate ought not to be served, and the magistrate has no jurisdiction to try the defendant, as he is entitled to plead autrefois acquit.

This was a case stated by the stipendiary magistrate for Staffordshire, on the hearing of an information in relation to a sale of milk by the appellant Haynes on February 16th, 1914. It was alleged that the milk was not of the nature, quality, and substance demanded, and was sold to the prejudice of the purchaser. It appeared that a summons in respect of the same sale of milk had been served on the appellant, and that upon the case coming on for hearing objection was taken that no copy of the certificate of analysis had been served with the summons as required by sect. 19, sub-sect. 2, of the Sale of

Food and Drugs Act, 1899. This was not disputed, and the magistrate thereupon dismissed the summons without hearing any evidence as to the facts of the case.

Subsequently another summons was taken out by the respondent in respect of the same sale of milk, and with this summons a copy of the analyst's certificate was served. The defendant objected that the magistrate had no jurisdiction to hear the case, as the previous summons had been dismissed, and the matter was at an end.

The magistrate held that, as the previous summons had been dismissed on a point of procedure, he had jurisdiction to try the case, and he convicted the defendant of the offence charged.

The Court by a majority allowed the appeal, and quashed the conviction.

RIDLEY, J., said that the magistrate had jurisdiction to try the case on the first summons until the objection was raised. The defendant was therefore in peril, and could in consequence properly plead *autrefois acquit* to the second summons.

AVORY, J., agreed. If the absence of the certificate had prevented the magistrate from having jurisdiction in the first instance, the plea could not have been raised that the man had been in peril; but as the service of the copy certificate was a matter of procedure, and did not prevent the Court having jurisdiction until the objection was raised, he was of opinion that the defendant was entitled to plead that he had already been tried.

LUSH, J., was of a contrary opinion. He said that unless there had been an acquittal on the facts or merits of the case, there was no ground for the plea of *autrefois acquit*. He did not think the appellant ever was in peril, and therefore he thought the magistrate was right.

RECENT PUBLIC HEALTH LITERATURE.

Alcoholism.

GORDON (A.). Prophylactic and administrative measures against alcoholism. *Med. Temperance Review*, 1914, *xvii*, 131.

Blackwater Fever.

DEADERICK (W. H.). Blackwater Fever. An analysis of 34 cases. *New York Med. Journ.*, 1914, *c*, 873.

Cholera.

HEISER (V. G.). Cholera in the Philippines during 1912. *Med. Record*, N.Y., 1914, *lxxxvi*, 827.—McMILLAN (J. F.). Asiatic cholera. *Journ. Trop. Med.*, 1914, *xvii*, 354.

Contagious Diseases.

PRICE (W. H.). A year's experience with contagious disease nurses. *Journ. Amer. Med. Assoc.*, 1914, *lxiii*, 1811.

Diagnosis.

LINDSAY (J. A.). The threshold of disease. *Brit. Med. Journ.*, 1914, *ii*, 955; also *Dublin Journ.*, 1914, *xxxviii*, 406.

Dysentery.

HEFFERMAN (CAPT. P.). Asylum dysentery. *Indian Med. Gaz.*, 1914, *xlix*, 417.

Education.

HOSNY (M.). Statistical notes on the influence of education in Egypt. *Biometrika*, 1914, *x*, 280.

Exercises.

ELMSLIE (R. E.). Remedial exercises in schools and school clinics. *School Hygiene*, Lond., 1914, *v*, 139.

Flies and Disease.

DAWSON (J.). Fighting the fly in the interests of public health, the story of a successful crusade in Cleveland against flies. *Scient. Amer.*, 1914, *cxi*, 259.

Flour-moth.

SHIPLEY (A. E.). Insects and the War: The flour-moth in soldiers' biscuits. *Brit. Med. Journ.*, 1914, *ii*, 614.

Food.

DE FOREST (H. P.). Hygiene of nutrition. *New York Med. Journ.*, 1914, *c*, 77.

Gymnastics.

SYSON (A. E.). School gymnastics. *School Hygiene*, 1914, *v*, 82.

Health Officers.

GARDINER (B.). The varied nature of the work of Women Public Health Officials. *Journ. Roy. Sanit. Inst.*, 1914, *xxv*, 511. Discussion, p. 515.—JONES (H.). Address on the public health service and the national crisis. *Med. Magazine*, 1914, *xxiii*, 636.—McCOMB (E. V.). A plea for more help for the health officer. *Public Health*, Michigan, 1914, *N.S.*, *ii*, 555.—RAVENEL (M. P.). The education of health officers. *Journ. Amer. Med. Assoc.*, 1914, *lxviii*, 1617.

Heredity.

BATESON (W.). Abstract of a Presidential Address on heredity. *Lancet*, 1914, *ii*, 435.

Hospitals.

RICHARDSON (D. L.). The prevention of communicable diseases in general hospitals. *Journ. Amer. Med. Assoc.*, 1914, *lxviii*, 1941. Discussion, p. 1944.

Housing.

CAVE (W.). Domestic architecture and sanitation. *Journ. Roy. Sanit. Inst.*, 1914, *xxv*, 401.—RADCLIFFE (J.). The shortage of houses in the cotton manufacturing districts. *Journ. Roy. Sanit. Inst.*, 1914, *xxv*, 443. Discussion, p. 447.—TYNDALE (W. C.). The sanitation of the country house. *Journ. Roy. Sanit. Inst.*, 1914, *xxv*, 406.

Hygiene.

DOUGLAS (C. C.). The training of teachers in hygiene. With special reference to their future professional work. *Journ. State Med.*, 1914, *xvii*, 607.

Hygiene, Tropical.

KING (COL. W. G.). Applied hygiene in the Tropics. *Tropical Lis. Bull.*, 1914, *iv*, 413.

Immigrants.

BRYCE (P. H.). Instructions for the medical inspection of immigrants. *Canad. J. M. and Surg.*, 1914, *xxxvi*, 116.

Immunity.

FISHBERG (M.). Tuberculization and immunization. *New York Med. Journ.*, 1914, *c*, 497.

Infant Feeding.

GITTINGS (J. C.). The caloric value of the diets of sick infants. *Archives of Pediatrics*, 1914, *xxxi*, 696.—CAMPBELL (H. G.). The provision of medical treatment at infants' consultations; or the scope of the infant clinic. *Pediatrics*, 1914, *xxvi*, 536.—RIMER (E. S.). Some essential points in infant feeding. *New York Med. Journ.*, 1914, *c*, 921.

Infection.

TROTTER (G. C.). Co-ordination in administrative methods in dealing with infection and infantile mortality. *Med. Press*, 1914, *ii*, 117.

Insanity.

HERON (D.). An examination of some recent studies of the inheritance factor in insanity. *Biometrika*, 1914, *x*, 356.

Insects.

SHIPLEY (A. E.). Insects and the War. The bed-bug. *Brit. Med. Journ.*, 1914, *ii*, 527.

Isolation.

WOOLLEY (P. G.). Isolation: Its prophylaxis and treatment. *Journ. Trop. Med.*, 1914, *xvii*, 230.—McCLURE (W. ST. C.). Hospital isolation of scarlet fever and diphtheria cases. *Journ. Roy. Sanit. Inst.*, 1914, *xxv*, 380.

Kala-Azar.

GORING (W. McC.). Segregation and Kala-Azar. *Indian Med. Gaz.*, 1914, *xlix*, 301.

Lavatories.

RICHET (E. D.). The chemical closet. *Public Health*, Michigan, 1914, *N.S.*, *ii*, 307.

Law, Sanitary.

KING (W. F.). Sanitary Laws. *Journ. Indiana M. Assoc.*, 1914, *vii*, 278.

Leprosy.

MARCHOUX (E.). The leprosy of rats. *Med. Press*, 1914, *ii*, 332.—DYER (J.). The duty of the Government in leprosy care and control. *Journ. Amer. Med. Assoc.*, 1914, *lxii*, 298.—JOHNSTON (J. A.). A contribution to the bacteriology of leprosy. *Philippine Journ. Sci.*, 1914, *ix*, B, 227.

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LOEFFLER.

TO live in an age of scientific progress in medicine, and to act on the knowledge so placed at our disposal, is the good fortune of our contemporaries; to have been the originator of discoveries such as have followed in the wake of the cultivation of the diphtheria bacillus is the proud distinction which must be accorded to Loeffler, whose death has recently been announced in the Press.

Prior to Loeffler's discovery, the nature and cause of the disease which we now know as diphtheria were involved in obscurity. The additions which frequent study of the disease made to precise knowledge came slowly. It is true, and worthy of mention, that a few careful observers had called attention to certain of its principal features. Home, of Edinburgh, in 1765, wrote "An Enquiry into the Nature and Cause of Eroup," which attracted world-wide attention. Bretonneau, the famous French physician, in 1818, came to the conclusion that "diphtheritis," occurring under different forms, is a single etiological *ens morbi* just like scarlet fever, and later, pathological anatomists notwithstanding, reiterated his conviction that all forms of the disease were infectious.

With the rise of bacteriology, however, much attention was devoted to ascertaining the relationship of bacteria to diphtheria—Letzerich, in 1880, and Klebs, in 1881, being the first observers to obtain cultivations of the diphtheria bacillus. It remained for Loeffler to submit the bacillus to a careful and scientific examination, and in 1884 he succeeded in satisfying Koch's postulates. Refusing to be carried away by too great an enthusiasm, he hesitated to accept unreservedly the bacillus he had isolated as the causal agent of diphtheria, in view of its occasional occurrence in the throats of healthy individuals. Confirmation of the almost constant presence of the bacillus in persons suffering from epidemic diphtheria afforded by the observations of many workers enabled Loeffler, in 1890, to assert definitely that the bacillus was constantly associated with

diphtheria, and that it was not a common or regular inhabitant of the pharynx. He drew up excellent rules for the prophylaxis and treatment of diphtheria, for the isolation of patients and for disinfection, and advised in the use of remedies to combat the bacterial poisons elaborated by the diphtheria bacillus. Further, in 1887, he succeeded in obtaining the poison which he had postulated was the disease producing agent of the diphtheria bacillus.

Following these observations came the valuable work of the French investigators, Roux and Yersin, on the toxin of the diphtheria bacillus, and the fundamental researches of Behring and Roux on the discovery of anti-toxins and their application to the treatment of diphtheria. As a consequence of these experimental observations, methods were devised whereby animals could be immunised against fatal doses of the poison of the diphtheria bacillus, and in 1893 anti-diphtheritic serum was introduced for human use on a large scale.

The experimental work done in this connection has promoted and stimulated the knowledge of sero-immunity, and, as need hardly be pointed out, the efficacy of the serum used to combat diphtheria so elaborated has proved to be of the greatest value to the human race.

Loeffler has done much excellent work in the investigation of other diseases, especially must attention be called to his most valuable work on filter passing virus.

In considering the history of this disease, the picture that presents itself to our mind is that of a foe which has for an unknown period waged its war against communities, respecting neither class nor country. In order to ward off the attacks of the enemy and to drive him from his entrenched position, there have never been lacking armies mobilised from every country. For long the enemy remained in the ascendant, but within recent years, so efficient has been the artillery evolved by modern science, that we have less reason to fear his attack. This happy result has been gained by

the co-operation of medical men of all nations, and it may well be said that our predecessors have made most extensive conquests, not by destroying but by promoting the health and happiness of the human race. In this and many other kindred struggles the profession of medicine has known no territorial boundaries, and at the present juncture, when we are sharply separated in many matters from some of our Continental colleagues, we do well to remember this. The information that has so far reached us as to the care bestowed on our sick and wounded in hospital by German medical men, in contradistinction to the general treatment of English prisoners in Germany, encourages us in the belief that in spite of this War of Nations a Commonwealth of Medicine may yet survive.

OBITUARY.

We regret to announce the death of DR. JOSEPH HARWOOD WILSON, which took place on April 8th. He was medical officer of health to the Wigan Rural District Council, and of the Standish Section of the Wigan Union. Dr. Wilson was Surgeon to the Standish Branch of the British Red Cross Society, having charge of the Woodlands No. 3 Hospital, and was a Fellow of the Society of Medical Officers of Health.

We regret to announce the death from pneumonia of NATHAN HANNAH, L.R.C.P., Edin., L.R.F.P.S., Glasgow, which took place at Rock House, Ashton-in-Makerfield, Lancs., on April 6th. Dr. Hannah had been medical officer of health of Ashton U.D. for 40 years and was also for many years a Fellow of the Society of Medical Officers of Health.

We regret to announce the death of Dr. BERTRAM LEEDS THOMAS BARNETT, formerly medical officer of health and school medical officer of the Administrative County of the Isle of Ely.

Shortly after the outbreak of war, Dr. Barnett was appointed Captain in the Army Service Corps, but he was compelled to relinquish his duties on account of varicose veins. He re-joined his Corps after undergoing an operation, but a recurrence of his previous condition took place, and he was advised that there was no prospect of improvement. The fact that he would be incapacitated from serving with his Corps seriously affected his mind with the result that he took his own life on April 18th. Dr. Barnett's qualifications included M.A., M.B., B.C. (Camb.), M.R.C.S., L.R.C.P. (Lond.), D.P.H., and he also qualified as a solicitor. He was a Fellow of the Society of Medical Officers of Health.

SOME NOTES ON A SERIES OF CASES OF DIPHTHERIA.*

By W. G. WILLOUGHBY, M.D., Lond., D.P.H., Camb.

Medical Officer of Health and School Medical Officer of the County Borough of Eastbourne.

THERE are not many diseases that have had more written about them than diphtheria, but there are still important points in connection with the disease that are not settled.

I do not pretend that I can give any additional facts that will settle these points, but one or two special circumstances in connection with my duties as regards diphtheria are the cause of my again bringing the subject before you. One is the personal experience over more than twenty years of a long series of over 1,600 cases where I have had to look after the patients, and attend to the circumstances of the cases personally in the triple rôle of medical officer of health, medical attendant on the patients, and bacteriologist. (By the last I mean a mere worker in crude morphological bacteriology).

Another peculiar circumstance is that the soil of the district in which my cases have occurred is of very varied geological formation, so that to some extent I can give comparisons of incidence of diphtheria on similar classes of people on different soils.

The connection of the incidence of diphtheria with special soils on which houses are built has been a very much discussed subject, and the variety of soil on which my cases have occurred with equality of conditions in other respects, makes comparisons in these cases less open to objection than usual. I consider that the nature of the soil and the condition that soil is in are important factors in relation to the prevalence of diphtheria. Before discussing this I wish to refer shortly to the immediate cause of the disease.

Loeffler's discovery of the specific bacillus of diphtheria enabled him to claim in 1884 that he had satisfied the three postulates of Koch with reference to the relation of a micro-organism to a disease, i.e., the organism had been always found arranged in a characteristic manner in the affected part; the organism had been isolated and obtained in pure culture, and the disease had been reproduced by the inoculation of pure cultures.

The fact remains, however, that as in other diseases, though we cannot have the disease

* Read at a Meeting of the Society of Medical Officers of Health on March 12th, 1915.

without the bacillus, many individuals harbour the bacillus without suffering from the specific disease, and until we know what other condition (or conditions) besides the bacillus of diphtheria is (or are) necessary for the production of the disease, or what causes the bacillus to become pathogenetic, we are not going to stamp out the disease.

It is easy to state generally that, as regards this disease and others, some individuals are immune, but the question is how are they immune. It is by no means proved that the individuals who are found quite well with bacilli in the mucous membranes are immune in the same particular way as a recovered patient is immune. Only a few of these instances are cases of immunity through a previous unnoticed attack.

It is true that Abel and Wasserman (quoted in the comprehensive work on diphtheria of Nuttall and Graham Smith) found that the blood of many healthy individuals, who had not recently suffered from diphtheria, was capable of protecting the guinea-pig against fatal doses of diphtheria bacilli or diphtheria poison. The protection by an attack of diphtheria from a second attack in the same individual, however, we know lasts a very long time, and in most cases permanently, and there are we know many mild unnoticed cases, so that unless the blood was taken from persons absolutely known not to have had an attack at all, this experiment does not seem to help very much.

In any case such an experiment would not explain the fact that there is much more apparent immunity in some districts than others, and that in spite of isolated cases some districts remain free from endemic diphtheria. There appears to me to be more genuine immunity of districts than of individuals.

The theory has been suggested that the bacillus has a saprophytic as well as parasitic existence, and in its former condition does not produce the disease, but in school epidemics I have found, as most of you have, that in children in the same class and under what seem to be identical conditions apparently similar bacilli exist, in some cases doing no harm to the child, and in others causing more or less serious clinical diphtheria. This occurrence one has also found in individuals in the same affected house.

It is difficult to imagine that in these outbreaks in a school or house the bacilli are amongst themselves different as regards their

pathogenetic power in the different children at the moment they are deposited on the throats.

Though in individual cases previous sore throat or cold has not infrequently been described, observation of school and house outbreaks do not show that ailing children are exclusively liable to attack; apparently healthy children also suffer. There has been no indication that in such cases the determining factor of the pathogenetic character of the diphtheria bacillus has been previous ill-health.

There is clearly in clinical diphtheria a selection of individuals in a district as well as a selection of districts, and in connection with this I consider it important that very few cultures of micro-organisms from the throats of persons affected with diphtheria are composed of Klebs-Loeffler bacilli only. It is probable that the presence of secondary pathogenetic bacteria or their products have an important bearing on the course of action of the specific bacilli or of the poison produced by them.

I have noticed frequently that the cultures from an infected throat where the patient has no symptoms, or very trifling symptoms, are more free from secondary bacteria than the cultures from a severe case. I have also noticed that in cultures from cases waiting for discharge from hospital where the patient has been clinically well for some time, but where the bacilli are persistent, I obtain the cultures most free from other organisms and most perfect as specimens of diphtheria bacilli morphologically. I should be interested to learn if that is the experience of others. I have had no time or opportunity to experiment with the sundry bacteria found. They are mainly streptococci and staphylococci.

Of the three theories to which I have referred viz., a possible real immunity of individuals (not including ex-patients), variation of pathogenetic and saprophytic existence of the bacillus, and mixed infections, as determining clinical from merely bacteriological diphtheria, the last seems to me specially important as being least hypothetical and more in accordance with direct observation. This has an important bearing on treatment. There is no time as a rule to obtain autogenous remedies but polyvalent sera should be tried with the anti-diphtheritic serum. Though this theory is not proved, it is my opinion that we shall not exterminate diphtheria if we are content to look upon the discovery of the specific bacillus,

most important as it was, as the end of necessary bacteriological research.

I may mention here another item I have noticed in the morphological bacteriology of the disease, viz., that in school outbreaks there are practically always cases at the same time showing diphtheroid and "Hoffman" bacilli, and in some cases during recovery from diphtheria after the typical bacillus has ceased to appear, these bacilli are found instead.

I know that the consensus of opinion is that there is no degeneration or regeneration from one to the other, especially in the case of the Hoffman bacillus, and I have not sufficient experience to do more than say that it has happened sufficiently often in my cases to make me notice it. In dealing with an outbreak in a private school, I should certainly not certify the school as absolutely free while there were any instances of the presence of diphtheroid or of Hoffman bacilli.

I have already mentioned that one of the peculiarities of the district where my cases have occurred is that it presents wide varieties of soil on which the houses are built. In this connection I propose to give some figures.

Statistics are dangerous in discussing any disease, and in diphtheria seem almost worse than in any other. At Blackpool in July last Dr. Snell gave us a careful compilation of figures showing that apparently those districts were better off, both as to prevalence and fatality, that did not take diphtheria cases into hospitals.

I think that the true explanation of his figures is district immunity, and that diphtheria is of such varied incidence according to locality that one district cannot be fairly compared with another. Whatever was left undone in a non-diphtheria district there would be less diphtheria than in a district where diphtheria is endemic, in our present state of knowledge.

In a district where diphtheria is endemic the prevalence and fatality would easily be still worse without hospitals, and in a non-diphtheria district the prevalence and fatality would be probably even less if isolation and hospital treatment were provided, unless one takes the view that proper care of any disease is useless.

As instances of the failure of isolated statistics in diphtheria I may mention the following:—

My own figures show that I only began to get "return" cases from diphtheria when I

adopted the system of discharging patients from hospital after they were bacteriologically free. Here an explanation is probably that the numbers are too small to eliminate accident. A return case of diphtheria is, in my experience, a rarity. I had none whatever for years before bacteriological examination of patients became a routine. I must in those years have sent out many ex-patients with diphtheria bacilli, and the absence of return cases tends to confirm my theory that diphtheria bacilli, as a rule, will not alone cause clinical diphtheria.

In spite of the drawbacks to statistics, however, I propose to give some, but they will not be many, for the possible sources of fallacies to be eliminated have proved to be so many that I had to abandon certain figures I had prepared. Those I have given I shall be glad to have criticised.

The district geological map which I have hung on the wall shows the nature of the soils of the area on which the houses are built to be in strips of varying width. From the west-eastward we have areas on chalk, valley gravel on chalk, alluvium, and beach.

Groups of houses of approximately the same class are to be found on the chalk, on alluvium, and on the beach, so that approximate comparisons as to diphtheria in persons living on these soils can be made.

The characteristics of the three soils are as follows:—

The Alluvium is persistently wet with much organic matter. The water is within a few feet of the surface, and special bye-laws as to concreting, iron drains and height above O.D. have been passed to ensure safer building.

The Beach, as its name implies, is wet at a certain depth, but from its nature well-drained and the ground porous. Its retained organic matter has a chance of removal.

The Chalk, though good as regards subsoil drainage, when it is much puddled approaches a clayey consistence on the surface, and surface drainage is sometimes not good. It does not, however, have much organic matter in it; what is on or near the surface in the clay-like portion cannot get away easily.

In the district described, the first two are low-lying areas, the last averages about 70 feet above sea-level.

The subjoined table shows the numbers of houses on each class of soil that can fairly be compared through the social position of the inhabitants being approximately equal, the number of cases of diphtheria occurring in these houses, and the percentage attack rate.

The second table shows the numbers and percentage-rate of the fatal cases.

The attempt to associate diphtheria with districts was dealt with many years ago by Dr. Longstaffe. For the 26 years up to 1880 the counties with most diphtheria were Norfolk, Lincoln, Sussex, and North Riding; but, on the other hand, the mountainous Welsh counties were next in order. In those early days diphtheria was a disease of sparse districts, and has gradually since become relatively more frequent in populous districts. Somerset, with much low-lying marsh district, was one of the least affected counties. I have not been able to obtain similar figures for a series of years since.

CASES						
1162 CASES ON THE THREE SITES TAKEN						
Series of 20 Years						
	Houses	Per-centage	Actual Cases	Per-centage	How the Cases should have theoretically occurred adjusted to House Percentage	Excess
(1) Alluvium	2859	46	655	56	534	+121
(2) Beach	1532	24	242	21	349	-107
(3) Chalk	1776	30	265	23	279	+14
Totals	6167	100	1162	100	1162	

NOTE.—Population per house about the same. Somewhat largest houses on Chalk, smallest on Beach. Epidemics do not affect the above figures. Social position almost exactly equal on the first two, a little better than either of these on the third.

Occurrence of diphtheria in different districts is not easy to tabulate. The Registrar-General in his report for 1912 states that the figures show mortality for diphtheria greatest in the north, and the prevalence, as indicated by notifications, at its lowest in the north.

This may be explained by the existence of a severer type, by the children being less resistant or by more careful notifications in the south; for, as the Registrar-General, says:—"Diphtheria is a disease found to a considerable extent in the degree in which it is looked for." The fatality varied from 76 per 1,000 in the south to 125 in the north.

Though my figures do not show a very great difference, they point in the direction of the view of the late Sir R. Thorne Thorne, who said: "Where a surface soil is by reason of its physical constitution and topographical relations such as to facilitate the retention of moisture and organic refuse, and where a site of this character is in addition exposed to the

influence of cold wet winds, there you have the conditions which do tend to the fostering and fatality of diphtheria, and which also go to determine the specific quality of local sore throat."

Apart from figures, we locally expect cases of diphtheria on the low-lying alluvium after rainfall (and in the old days, before the completion of a comprehensive drainage scheme, after the flooding on the alluvium that accompanied it) and we are not disappointed as a rule.

In one long street on the alluvium, a marked improvement on house incidence followed re-sewerage with iron drains lessening organic contamination. The improvement has lasted sufficiently long to eliminate the explanation that the pabulum (susceptible persons) was exhausted.

As regards rainfall and diphtheria, for 20 years December, November, October, February and January have been the months

DEATHS			
Series of 20 Years			
	CASES	DEATHS	FATALITY PER CENT.
Alluvium	655	46	7.0
Beach	242	15	6.2
Chalk	265	20	7.5
TOTAL	1162	81	6.9
Remaining Houses	531	25	4.7
TOTAL	1693	106	6.2

NOTE.—Practically 100% of all cases are treated at the Borough Hospital, so that the treatment is the same in each case. This table indicates approximately the severity of the cases in each district.

with most cases in order, and September and June the best months; while in the same 20 years October, December, November, and January have been the wettest months. The theory has been advanced that a rising of the ground water has had something to do with the increase in number of cases, but I cannot find any satisfactory evidence of a causal connection in my district.

Diphtheria has been shown by Dr. News-holme to be connected with dryness, but my cases have occurred principally during the wet months, and not immediately after the close of the dry period. September, the close of the dry period, has been the month with least cases.

I do not propose to review the other etiological factors of diphtheria, for as regards age, sex, etc., they have been much the same in my cases as described in text books.

In spite of the large number of cases referred to (1693), and although cases must have

occurred in workers handling milk, there have been no milk epidemics.

In the last ten years, in a population with the sexes approximately equal in the chiefly affected age group, the proportion of cases according to sex has been five males to six females, and the fatality five males to seven females. Approximately two-thirds of the patients were in the age group 5-15.

Personal infection must be the chief means of spread. I have frequently been able to trace cases from persons to persons in different parts of my area, particularly from the alluvium to the chalk area. It is very seldom one gets a second case from the same house after the first case is removed.

I have noticed that the cases come largely from the artizan class; the well-to-do rarely suffer, and only lightly as regards severity. The second table shows this to some extent. The poorest and worst-kept houses, however, proportionally provide less diphtheria than scarlet fever. The diphtheria cases are often from very clean houses and in well-kept children.

The sanitary condition of the house, in fact, seems a somewhat secondary consideration, except in so far as general ill-health may predispose to diphtheria. New houses supply decidedly more than their proportion of cases, especially on the alluvium. I look upon a damp house on a damp organically contaminated soil as a most definite predisposing cause, in some way tending to make a harmless bacteriological diphtheria become a clinical case of diphtheria.

I am not able from my cases to give any comparative results regarding cases removed to hospital and those not so removed, for the simple reason that, practically, all the cases—I may say all but about half-a-dozen of the undoubted cases of the 1697—have been isolated and treated in hospital. Very few—indeed, not a dozen—of the 1697 cases have been associated with scarlet fever.

In conclusion, I should like to refer to the decreasing mortality from diphtheria of recent years, which is most satisfactory.

I think I am right in saying from my observations that most of the deaths that do still occur are preventable, however difficult of prevention the cases themselves may be. It is merely a matter of giving the specific anti-toxin soon enough. That this is so, is sufficient proof that the injury to the patient, even though the infection may be a mixed one, is due to the Klebs-Loeffler bacillus in the main.

Very occasionally a case occurs that within a few hours becomes so intense that anti-toxin has no apparent effect, and in these I have found by cultivations that the diphtheria bacillus is in scanty proportion to the various other organisms, mainly streptococci, found; but, as a rule, one may safely say that anti-toxin given on the first day of the illness would have saved the life of the patient, and every hour of delay the remedy became less useful.

Unfortunately, in spite of the free supply of anti-toxin at stations open day and night, practitioners have not even yet got into the habit of giving the specific cure while waiting for time to aid them in completing their diagnosis.

The fact, however, that sore throats being common ailments, the doctor is frequently not sent for in time, especially if the patients are in poor circumstances, is the main cause of diphtheria mortality now that we have such an antidote as diphtheria anti-toxin. I have found locally that police-stations—owing to someone being always in attendance there—make excellent anti-toxin distributing stations.

DISCUSSION.

The PRESIDENT said that the subject dealt with by Dr. Willoughby was specially suitable for discussion by a Society whose members were so closely concerned with the administration of public health, and he was sure that the discussion would be both useful and instructive.

DR. J. T. C. NASH (Norfolk County Council) said he had listened with peculiar interest to Dr. Willoughby's instructive paper. He had been particularly struck with many points in it which bore upon the question of the evolution of disease, a subject to which he had devoted much attention. The same factors noted in the causation of diphtheria were also found in other diseases, as, for instance, in pneumonia and typhoid fever, "carriers" of the pneumo-coccus and of the bacillus typhosus being numerous. In his own experience, when investigating some outbreaks of scarlet fever he had found among children at school some children who had had scarlet fever a year or two previously, but who at the moment showed nothing more than a slight nasal discharge. He believed that some of these children without the ordinary symptoms of scarlet fever were either "carriers" of the organism chiefly responsible for the development of scarlet fever, which had reacquired virulent properties for other children, or were themselves reinfected from other cases, but, being immune through a previous attack, they developed none of the classical signs of the disease beyond a slight nasal discharge, which, however, was capable

of infecting others. Such cases could easily be overlooked, and their responsibility for causing further outbreaks not realised. Evolution or recrudescence of infection, without ordinary symptoms in persons who had previously had scarlet fever, was he thought an explanation of why administrative measures had failed to stamp out the disease. He (Dr. Nash) was of opinion that there was a relationship between scarlet fever and diphtheria. As an instance of the evolution of diphtheria, he would instance an outbreak of sore throats in a girls' school some years ago. Swabbings from the first cases, cultured on blood serum, showed practically pure cultures of a long streptococcus. Next day swabbings from a further batch of three or four cases showed, in addition to long streptococci, a few diphtheroid organisms. Later swabbings showed in one or two cases typical beaded diphtheria bacilli of the Klebs-Loeffler type. The polymorphism of the diphtheria bacillus is well known as a diagnostic feature in film preparations from a pure culture. Occasionally virulent diphtheria is associated with a short non-beaded form of bacillus which would be returned by some laboratories as Hoffman's bacillus. This short form was recognised and described by Westbrook, whose work on the diphtheria bacillus was of immense importance. Streptococci are frequently found in the throats of scarlet fever patients; one form of streptococcus isolated and described by Klein as the streptococcus scarlatinae shows bacillary forms not unlike diphtheroid bacilli. Dr. Willoughby had referred to Norfolk as among the counties where diphtheria was prevalent. Active measures had very considerably reduced such prevalence of late years. As to return cases these would diminish if care was taken not to release patients from quarantine until nasal as well as throat swabs were reported clear. His own experience coincided with that of Dr. Willoughby as to the existence of diphtheria in new and comparatively damp houses. All practitioners should take to heart Dr. Willoughby's advice regarding the administration of antitoxin as early as possible; he agreed that the police office, which was open night and day, was a good place in which the antitoxin could be kept so as to be available for instant use.

DR. J. J. PATERSON (East Berks. U.S.D.) said that in his opinion there was a third factor besides the two mentioned by Dr. Willoughby, which came into operation to make a case clinically diphtheria. What that factor was he could not say, but the following experience would illustrate. In the course of swabbing a certain school he found two "carriers." Both were put under medical treatment, one cleared up in about a fortnight, but the other, a girl, carried the bacillus without any symptoms whatever from early in May to the end of June, in spite of local

treatment, and then membrane began to develop. His experience of the relation of soil to diphtheria was somewhat different to that of Dr. Willoughby. Until the last two or three years, diphtheria was very prevalent in his district, especially in the villages along the banks of the Thames, but on the other hand, in another part of the district (Sandhurst) there was a peculiar geological formation of gravel and sand; but it was not a dry gravel, for below the surface there was a pan which prevented the surface water from sinking through, and all through the winter the land was waterlogged. In some groups of houses if the floorboards were taken up they found several inches of water, and yet, curiously enough, these places had very little diphtheria. When a few cases occurred they did not seem to spread. The children at the schools, however, were frequently absent with sore throats. He should like to know if Dr. Willoughby could say anything as to the qualities or properties of the diphtheria germ. He had tried all sorts of tests, but had never come across anything which caused the clinical disease; although it was not infrequently difficult to identify the diphtheria bacillus.

DR. H. W. HARDING (Assist. S.M.O., Walthamstow) asked Dr. Willoughby whether he had noticed any alteration in the morphology of the bacillus during the last few years.

DR. VEITCH CLARK (Croydon C.B.) said that the actual cause of diphtheria had been the subject of innumerable papers. He could not agree with some of Dr. Willoughby's statements. He was certain that Hoffman's bacillus was quite a different organism from Klebs-Loeffler: there was no relationship between the two; Hoffman's bacillus is morphologically and culturally distinct and it is also non-pathogenic. He had had several years' intimate experience of infectious conditions in a certain set of orphanages. Diphtheria was several times introduced into these orphanages from without, but was always suppressed by swabbing of the children's throats and noses and isolation of those carrying true diphtheria germs. Hoffman's bacillus was paid no heed to and no evil results followed. With regard to the occurrence of acidosis in diphtheria, he considered it a common feature, as in a large number of cases acetone could be demonstrated in the urine, and was undoubtedly associated with fat metabolism and fatty degenerative changes. Two questions had to be considered in regard to this subject, firstly, actual personal infection without which the disease could not occur; secondly, the power of personal resistance to the disease. They were indebted to Dr. Willoughby for bringing before them the conditions which tended to govern the individual power of resistance, as, for instance, low vitality. His investigations had confirmed the opinion of those whose experience showed the greater

incidence of diphtheria on damp soils. Damp soils to a considerably greater extent than the harder and drier geological formations tended to produce a lower average vitality in individuals. In his opinion, however, diphtheria is a purely personal infection, and he doubted very much if there was any marked life of the infective organism outside the human body at all.

DR. B. C. STEVENS asked what Dr. Willoughby would do with carrier cases. Should these be isolated, or should the homes be isolated?

DR. SIDNEY C. LAWRENCE (Edmonton) said that he wished to put in a plea for the general practitioners who worked in poor districts, and were often unable to get payment for their visits. They had sometimes been held blameworthy for not giving antitoxin to every case of diphtheria. But a patient was usually safely bedded in the isolation hospital within two to four hours of the notification. His experience was that nearly all diphtheria return cases were due to sending out the children from the hospital with a nasal discharge. Swabs should be taken of every case, either scarlet fever or diphtheria, admitted, and the patients should never be discharged until at least two negative results had been obtained by cultivating swabs from throat and nose. There would be no return cases of diphtheria if that were the routine practice of the medical officer at the isolation hospital.

In Edmonton antitoxin was kept at the Town Hall, but when this building was closed, a supply for emergency could be obtained from the fire-stations, which were open day and night and well-distributed over the area. Fire-stations were less objectionable than police-stations as houses of call for medical men who were not police-surgeons and valued their reputations as staid members of society.

DR. CHARLES SANDERS (West Ham C. B.) said he wished to add his quota to the pleasure with which the Society had heard this interesting paper from one of its most distinguished Fellows. It was very comforting to those of the old school to know that modern science had proved that diphtheria arose from damp polluted soils accompanied by wet, cold winds. With the extension of scientific knowledge it was found necessary to carry on the hygienic measures advocated by the pioneers of the Public Health Acts, and that they had to adopt, with regard to modern infectious diseases, the same treatment from an administrative point of view with which they had checked the spread of, and caused the reduction of other diseases. What Dr. Willoughby had absolutely shown was that public authorities in town and country had not yet succeeded in properly draining all damp soils. As to Dr. Stevens' query about the isolation of all cases of carriers, he (Dr.

Sanders) questioned whether, from a legal point of view, they had any right to isolate a carrier unless the child had the disease definitely.

DR. T. ORR (Shrewsbury M.B.) said he agreed with Dr. Willoughby that the influence of soil had a large effect in the production of diphtheria, and that dampness of the soil predisposed to low vitality and consequent sore throat. He himself did not believe that immunity had much to do with the non-prevalence of diphtheria; it was all a question of susceptibility. On the question of symbiosis there was no doubt that the presence of dead matter in the throat favoured the growth of other organisms, but these did not affect the character of the disease. He agreed that Hoffman's bacillus was quite a different organism from that of diphtheria. In his experience, where children with sore throats attending public schools were swabbed, the result was not striking, nor was it striking where contacts in private houses were swabbed. In the hospital, where cases were swabbed until negative results were obtained, they had no return cases.

DR. T. W. NAYLOR BARLOW, hon. sec., said he agreed with Dr. Orr that there were no return cases where negative results were obtained after frequent swabbing.

DR. A. M. ERSKINE (Goole), speaking from an experience of over 16 years, gave the instance of Goole, which has a population of 22,000, and a naturally wet subsoil of alluvial deposit. Contrasted with diphtheria, scarlet fever, although imported repeatedly, does not flourish in the town. Last year, diphtheria, which has been endemic since 1899, suddenly took on an epidemic character during the early part of October. The cases were notified from all parts of the town, at the same time having no common connection, and although an extensive system of "swabbing" (both nose and throat) was instituted, in very few instances were positive results obtained, and where a positive result was obtained, the child was not isolated, but a very careful watch was exercised, and practically never could a second case be traced to this source. The notifications ceased just as suddenly in the beginning of February. As every one knows, the bright summer of last year was followed by continuous rain, which began in October and lasted on into the new year. The special features of the cases were:—Very little spread of the disease by personal infection, or at schools, or through the medium of milk, and the increased mortality. It is common knowledge that ordinary "sore throat" is a very common affection in districts with a damp subsoil and low lying, such as Goole. He gave it as his opinion that the Hoffman bacillus plays no part in the causation of the disease, but the subject was one for the bacteriologists to elucidate. *Prima-facie*

evidence suggested that there was a connection between diphtheria and the movements of the ground air. During the month of January the level of the subsoil water was two feet six inches from the surface, and this fell during February to three feet six inches. He offered the suggestion that, after a period of dry and warm weather followed by continuous rain, with the rise of the level of the ground water, cases of diphtheria occur, and if the rainfall be continued long enough and in sufficient quantity the time is reached when further activity of the disease is arrested. This accounts for his recent "Experience" of the disease, as well as similar ones in 1907 and in 1903, when he stated, "that with the rise of the ground water level more notifications were received." It is understood, of course, that he is not referring to the spread of the disease by means of personal infection, or by milk, etc., but only with its endemic causation.

The PRESIDENT said that there had emerged from the discussion the satisfactory conclusion that the more or less empirical work of public health pioneers was bearing fruit, and that the theories as to infection propounded in the last century had not been upset by the more exact observations of later years. For some years he had placed great reliance on the swabbing of the children in a diphtheria infected school as a means of lessening the incidence of the disease, but the results obtained were not always so satisfactory as could be wished.

DR. WILLOUGHBY, in reply, said that as regards isolating all carrier-contacts he had found it impracticable, but it was easy to treat persons who had bacteriological diphtheria in their homes, and all infected children could be kept from school until the throat was clear without much practical difficulty. He was quite ready to defer to the opinion that the Hoffman bacillus was in no way connected with the true diphtheria bacillus, he only pointed out that in a large number of his cases the Hoffman bacillus appeared at a late stage. In stating that in very bad cases there were many more foreign bacilli than in mild cases he had allowed for the fact that there would, of course, be many extra bacteria naturally owing to the foul condition of the throat. There was no doubt in his mind that although it was contrary to scientific theory, no important result had accrued from the practice of taking swabs and examining them before discharging patients from hospital. He could only repeat that although he believed the practice ought to be continued, yet over a period of many years there was not a single return case in what must have been quite a thousand discharges without bacteriological examination. This helped to show that some other factor besides the Klebs-Loeffler

bacillus was necessary for clinical diphtheria. Dr. Willoughby said it would be impossible to go over the whole of the ground covered by the remarks of the various speakers owing to time, and he concluded by thanking the members for the kind way in which they had received his paper.

MEMORANDUM ON THE DESTRUCTION OF VERMIN.

Issued by the Society of Medical Officers of Health.

THE importance of a national effort to suppress all forms of vermin affecting bodies, clothing and households has been emphasised by the existing war conditions.

The Army authorities have efficiently dealt with the question of lice as affecting the soldier, and the hope of the Society is that similar instructions regarding these and other parasites may prove useful to local authorities.

BODY VERMIN (fleas, bugs and lice) are injurious to health in that—

1. They cause discomfort and loss of proper rest;
2. They cause indirect injury to the skin, with consequent possibility of infective absorption;
3. Under certain circumstances the vermin may directly transmit serious disease through their bites.

The destruction of the insect is easier than the destruction of the eggs.

The eggs of the flea develop in 2-5 days (adult insect in 10-18 days); of the bug in 7-10 days (adult insect much longer); of the louse in 10-15 days.

The value of frequent change of underclothing to remove undeveloped eggs and partially developed insects is thus strongly indicated.

Body vermin, particularly bugs, can live without food for long periods.

To suppress the Vermin—

1. *For the Body and Head.*—Ordinary hot baths with soap are sufficient, except in the case of head lice. For these and their eggs, paraffin or diluted acetic acid (hot vinegar) should be well rubbed in over night; the head should be thoroughly cleansed with soft soap and water the following morning, and then combed with a small-toothed comb. This should be repeated every night until there are no more eggs or nits visible. It should be remembered that paraffin is very inflammable.

2. *For the Clothing.*—Heat at or above boiling point is the most efficient method of destruction of insects and their eggs. Every Authority should have a steam disinfectant available for vermin destruction. Paraffin or petrol, especially along the seams of clothing, is also useful.

3. *For the House.*—Continuous cleanliness is the best measure. This prevents the development of eggs. Neither gaseous disinfection nor liquid disinfectants are to be relied upon. Some insect powders, chloride of lime and powdered naphthalin, destroy vermin. In crevices oily substances may be used with good effect.

It is a matter of urgent importance in dealing with vermin that the body, the clothing, and the house should be dealt with at one and the same time to prevent re-infection from one to another; further, for the same reason all infected persons living in the same house should be dealt with at the same time.

A mixture of oil, soap, and some disinfectant, such as naphthalin, spread over the body and clothing has been found efficacious in preventing as well as suppressing verminous conditions.

LEAD POISONING IN RELATION TO PUBLIC WATER SUPPLIES*

A NATIONAL QUESTION.

By J. ASPINALL MARSDEN, M.R.C.S., L.S.A., L.S.Sc. (Durham Univ.), Medical Officer of Health of the Shelf and Hipperholme District Councils.

THE West Riding has for long been associated with a special incidence of lead poisoning due to moorland water supply. It was a few years ago computed that in this area alone 1,114,000 persons were drinking unfiltered moorland water, and that considerably over half of these lived in districts in which multiple cases of lead poisoning had occurred.

The chief cause of such poisoning was acidity of the water, and at a survey, out of fifty-eight reservoirs examined, no less than thirty-five contained acid water possessing plumbo-solvent properties. As many of the remainder represented the dry weather flow, it is more than probable that some of these, too, would be sensibly acid in storm time.

Moorland gathering grounds are not by any means restricted to Yorkshire and Lancashire—a man died from lead poisoning from the water a few days ago near Swansea—so that this is indeed a national matter, for it affects the masses of the people and constitutes an important factor in the production of physical degeneration, for a serious deterioration of general health is induced by small doses of lead being taken for a long period.

Moorland gathering grounds are usually rich in peat; moist peat is invariably acid in reaction, and water draining from peat is always acid. The degree of acidity depends chiefly on the amount of peat and the length of time water has been in contact with it—the cause of it is the growth in the peat itself of acid producing bacteria.

Two non-motile bacteria possess separately the properties of acidity and plumbo-solvency. Drinking waters richest in bacteria, not of peaty origin, possess slightly greater solvent power upon lead than those poor in micro-organisms. Ordinary drinking water acts upon lead largely owing to the oxygen dissolved in the water.

Another factor, too, may at times be at work, viz., the oxidation of iron pyrites, but the strata-bearing pyrites usually crop out at a

much lower level than that of the lowest intake for waterworks purposes.

Spring water from the rock on the gathering grounds is invariably neutral, and ochre springs, which contain carbonate of iron held in solution by carbonic acid, rapidly deposit the iron on exposure to the air—these waters, too, are neutral.

Moorland spring water is neutral, often possessing acid neutralising ability, which, however, is not usually present in marked degree, whilst the acidity of peaty water varies within relatively wide limits.

During dry weather the water in moorland streams consists chiefly of spring water, but the "dry weather flow" on most gathering grounds is very small on account of the high elevation of these drainage areas, and usually quite inadequate to meet requirements.

The good effect of a fairly abundant supply of spring water is often lost in the excessive acidity of a comparatively small bulk of peaty water.

During storms the water in moorland streams is usually very acid, and acts strongly on lead, especially when wet weather succeeds a period of drought, as then the streams contain the first washings of the peat.

Millions of gallons of acid peaty water are then frequently allowed to enter the compounding reservoirs, which may have reached a very low level.

The reaction of mixed water is determined by the relative amount of peaty water and its degree of acidity on the one hand, and by the relative amount of spring water and the degree of its acid neutralising ability on the other.

The ratio between the degree of acidity and the degree of plumbo-solvent ability is not necessarily the same for all peaty waters, particular waters may have their own standards as it were.

The unregulated admission of flood water is the principal cause of the acid, and therefore objectionable water.

How great indeed are the potential risks from the temporary omission of precautions! or when, owing to change in the relative amounts and quality of the constituent waters, a temporary acquisition of lead dissolving property by the whole water service may suddenly take place.

On most moorland gathering grounds there are boggy, marshy places, and if underlying these there exists impervious marl the strongly

acid water is held in the peat, which may be several feet deep.

Certain geological and physical considerations have a favourable influence on the composition of moorland water, e.g., sparse distribution of peat on steep hill slopes, the active growth of grass, rapid surface drainage, etc., etc.

No doubt the peat in the bed of a reservoir assists in keeping the water acid.

Some moorland waters are not only acid but erode lead, so that by surface disintegration scales of lead are separated, leaving a new surface ready for further erosion. This erosive ability bears no definite relation to the acidity of a water.

It is advisable to test not only in the reservoirs and main streams, but also in the tributary stream and subsidiary feeders during different seasons of the year, and varying conditions of rainfall.

Risk of water acquiring plumbo-solvent ability may be guarded against by methods designed to exclude from the supply contributing waters found to be uniformly acid, and also by mechanical contrivances to prevent access to the supply of the first washings of peaty soil after periods of drought, e.g., automatic leaping weirs, the provision of brick bridges with stone filters at the upper ends, screening arrangements, etc.

Oliver advocates filtering the water through sand rich in silicates and strewn with fragments of limestone. It is, of course, undesirable to rely wholly on any system of treatment, however well designed, for specially acid water should be excluded.

In some instances acidity may be lost by being mingled with a large volume of acid-neutralising water derived from other sources.

Moorland waters only take up a small proportion of carbonate of lime, and, although slightly hardened by this treatment, they still remain very soft waters.

Since February, 1904, when I circulated a printed pamphlet on this subject to medical officers of health, a clause has been inserted in local Acts requiring the treatment of water for plumbism before distribution. The Local Government Board having learnt that in certain districts the matter had not received attention, sent out (December, 1908) a circular-letter to sanitary authorities, and every medical officer of health received instructions as to reporting on lead poisoning. From the answers to the circular-letter and the annual reports of

the medical officers of health details of forty-eight supplies open to suspicion were obtained, and the Board became aware of the fact that a considerable amount of lead poisoning still escaped attention. It was evident that the item "No cases of lead poisoning are recorded" meant in some instances that the subject had been ignored. For example, the Rhondda urban district water supply was under suspicion of causing lead poisoning, and the medical officer of health sent a circular-letter to the medical practitioners asking if they had under treatment any such cases. Replies—all in the negative—were received from twenty-nine practitioners. Next year a similar circular-letter was sent, adding that several severe cases of lead poisoning, apparently ascribable to the water, were under observation. Now twenty-three replies were obtained, giving thirty-five cases under treatment. In 1910 the Local Government Board summarised the results of their investigations up to that time, and I now give a few notes as to the local water supplies in the West Riding obtained from this report. Cases of lead poisoning were reported from nine districts, and positive results of lead on analysis were obtained from twenty-one districts.

In August, 1908, the county medical officer of health found twelve samples containing lead to a dangerous state, and on the action of the sanitary committee some form of treatment was adopted.

Baildon.—The water is plumbo-solvent, but is treated with lime and soda.

Barnsley.—The water absorbed no lead from old piping, but did absorb some from pipes that had been put in within five years. The medical officer of health of Worsborough reports "samples analysed by the county analyst contained a dangerous amount of lead." This was reported, and remedied by the Barnsley authorities.

Bradford.—Dr. Houston found in June, 1895, the High Level supply was acid, and the Upper Barden supply slightly acid. The town clerk wrote in 1908:—"For the last seventeen years the water has been treated with carbonate of lime, about three grains to the gallon. The county analyst found lead in samples of Shelf water (Bradford Corporation), but the corporation analyst took samples with negative results. Lead was found in all six samples taken in Clayton in 1908; the water was taken after standing in pipes all night. The medical officer of health of Denholme says four cases

* Read at a Meeting of the Yorkshire Branch of the Society of Medical Officers of Health on January 22nd, 1915.

of lead poisoning were discovered in September, 1908, and lead was found in the water used."

A few days ago I found lead in some of the Shelf pipes, but the Bradford authorities found none because they drew their samples in the day time and when in use!

Burley-in-Wharfedale.—Traces of lead were found in samples, and the reservoir was found acid. It was then treated with limestone at the inlet.

Dewsbury and Heckmondwike.—Dr. Low (Local Government Board) reported in 1908:—"The authorities would seriously fail in duty if they continued any longer to supply water in this potentially poisonous state."

Halifax.—The medical officer of health reports, 1908, "lime treatment greatly reduces the acidity of the water, but think it should be further reduced." Lead has been found on analysis in several samples in recent years, e.g., Hipperholme, Greetland, Elland, Hebden Bridge.

Huddersfield.—The Blackmoorfoot water is highly acid, and lead has been frequently found in samples tested. It is now treated with paris white.

Keighley.—The water acidity is removed by passing through filters containing limestone. Ammonia alkali is added.

Leeds.—The water in the Fewston reservoir is only faintly acid.

Morley.—Water very acid—was filtered through limestone and chalk, but with imperfect results. Better results were obtained by use of slaked lime in 1894. Later on soda was also added. At present ammonia alkali is used. It is dissolved in a tub, and the solution is run into the mains. This has proved quite satisfactory.

Otley.—Analysis reports state "plumbo-solvency is considerable, and has decided reaction with twenty-four hours' exposure of the water to lead." The medical officer of health says there are no cases of lead poisoning. Limestone filters are now used.

Ripon.—Fine limestone sand "of a particular character" acts as a reliable neutralising material.

Sheffield.—Treatment by whiting (two grains per gallon) and the undertaking of Stocksbridge by chalk filtration reported to be successful.

Shipley.—Dr. Houston in 1894 found the water highly acid. In 1903 it was treated with sodium and calcium carbonate, but more than a "permissible quantity" of lead was found, and the medical officer of health advised

in 1904 the use of charcoal filters and "to run the water for a brief period."

Skipton.—The plumbism clause was inserted by the county council because the small feeders were found acid.

Soyland.—In 1908 a sample showed one-tenth of a grain per gallon, and so lime treatment was instituted.

Thurlstone U.D.C.—Two cases of lead poisoning in 1908, and a sample contained one-fifth of a grain per gallon.

Todmorden Town.—"Public supply is deprived of its lead-solvency properties by treatment with limestone."

Todmorden Rural.—Three cases in recent years.

Wakefield Town.—Rishworth gathering ground is very peaty. In 1908 the town clerk writes:—"Present treatment is addition of carbonate of lime before and hydrate of lime after the filtration of the water."

Yeadon.—Water is acid and plumbo-solvent. Carbonate of lime is added, but is not very effectual.

Rawdon.—The medical officer of health says:—"It is quite possible the prevalence of anæmia may be due to this (lead) contamination."

Guisborough.—In 1913 the medical officer of health was able to supply a list of eighty-seven cases of lead poisoning in his own practice between March and the beginning of September. He found lead present in the urine of seventy-six out of 100 persons, whilst in other cases positive tests were obtained by other observers. It is of much interest to note regarding the water supply that in August, the acidity being still 0.2, the lime was suddenly reduced from fifty to twenty-two pounds following a suggestion made by Sir Thomas Oliver that the addition of lime had been too generous. Sir Thomas had found by experiments that the action of lead was less with the smaller than with the larger amount of lime. He also suggested that experiments should be made with a view of ascertaining whether some substance other than lime would be more beneficial.

More cases of lead poisoning were discovered since lime treatment was commenced than had occurred during the year preceding this treatment, and probably more cases had in fact occurred. Six samples of the treated water taken in the late summer had no solvent action, but three of them had relatively considerable "erosive" action.

It is difficult to account for the increase under lime treatment by the supposition that acid water was sometimes admitted to the mains, and the plumbo active power of the water requires other explanation. Probably the "erosive" ability and the long lengths of lead piping in use were the cause. The lime treatment is seldom quite satisfactory except as regards removal of acidity and consequent plumbo-solvency, and sometimes seems actually to render the water more prone to erode lead.

By erosion is meant of course disintegration of the surface of the lead, and the formation of an insoluble lead compound which tends to fall away from the metal leaving a fresh exposed surface. The brown readily detachable deposit when brushed from the interior of the lead piping contains about 42 per cent. of metallic lead.

The circumstances giving rise to erosion are complex while the chemical and physical conditions which favour it are not fully understood. Free carbon dioxide in the water results in lead compounds which would go into solution being converted into insoluble carbonate of lead so the lime treatment may sometimes be prejudicial by removing free carbon dioxide.

Dr. Houston speaks of the advantage of adding a proportion of sodium carbonate as well as lime.

Dr. Frank Seymour's conclusions regarding Guisborough water treatment were (1) The treatment was not of uniform adequacy so that insufficiently neutralised water may have found its way into the service pipes. (2) Treatment may have failed when the water was very acid, e.g., after the rain storms following prolonged drought (3) It is conceivable that destruction of plumbo-solvency may be more than counter-balanced by increased ability to erode lead.

Acid water dissolves metals rapidly, corroding iron and rendering it unfit for steam boilers, attacking galvanised pipes or cisterns, and so producing zinc poisoning and eroding or dissolving lead connections, boilers or lined cisterns.

Tin is sometimes used as a coating for both iron and lead pipes, but owing to galvanic action the corrosion is sometimes more pronounced than when the pipe is unprotected if the pipes be jointed by a plumber unused to fitting them, not otherwise.

Linings of tin must be pure and not an alloy of tin and lead. The most reliable of those with which I am acquainted is the "Heath Pipe"

There are now in the market (1) a lead pipe lined with block copper, which is not at all expensive (only a difference of 1½d. per foot on the 3-8 size), and has the pliability almost of a lead pipe; and (2) a steel pipe lined with block copper—a pipe stronger than a lead one, and cheaper, there being a difference of 9½d. per yard in favour of the "copper-lined steel pipe."

In this connection S. Rideal, D.Sc. (Lond.), F.I.C., writes me:—"I think you can take it that your northern moorland waters do not act upon copper, and that the copper-lined lead pipes or the copper-lined steel pipes which you refer to would stop lead poisoning in those districts where these waters have to be used for domestic purposes. It would be a good thing if one could do away with lead pipes altogether in your district in Yorkshire, and these new suggestions I do not think have been before the Local Government Board, or it would not have said that "the abolition of lead pipes seems impracticable." This is also the opinion of Professor Armand Gautier, head of the Council of Public Hygiene, Paris.

Wrought-iron pipes are not lined with Angus Smith's solution, and rapidly corrode. Nor do I believe the use of a 2-in. cast-iron main desirable; but, where possible, a 3-in. pipe of this material, treated with Angus Smith's solution, and provided with a hydrant, can be recommended.

Angus Smith's composition reduces the corrosion, diminishes the adherence of the rust, and prevents the formation of hard nodules. The best material for cisterns is slate.

Nitrates and chlorides in water exercise a distinctly corroding influence upon lead. Carbonic acid has a similar influence.

Lead carbonate is more toxic than sulphate.

Hot water and water under pressure dissolves lead more rapidly than cold water, and especially lead of inferior quality.

Hot water from the domestic service supply is strong poison, and children are often injured in health by nurse-maids filling their kettles with it from, say bath-tubs, or lead may find its way into our victuals by the negligence of the cook, or by the use of enamelled or tin ware.

Lead may be removed by filtration of the water through animal charcoal, but this action cannot be trusted, so that even traces of this metal should condemn a water at once.

The action of water on lead service-pipes has been observed by two competent analysts

over a period of seven years, and the result recently reported upon. The experiments were made under three different conditions, which are described by the names of alphabetical pipes, consumers' pipes, and corked pipes.

Alphabetical Pipes were made from one piece of $\frac{1}{2}$ -inch lead pipe. The first 22 ft. of this was cut off, and marked "A," the second 22 ft. "B," and subsequent similar pieces "C," "D," "E," "F." Each length was wiped on to the water-supply pipe, a stop-tap being placed at the commencement of each length, and a bibb-tap at the end.

Consumers' Pipes.—These samples were taken at consumers' houses, and were liable to several sources of error; the number of hours during which the water was in the pipe would vary, leakages during the night might occur, and possibly, owing to forgetfulness, the sample taken might not be the first taken from the tap.

Corked Pipes.—These were each 6-ft. long, and were cut from one length of $\frac{1}{2}$ -inch tubing, and bent so that the two ends were close together. The water in these pipes was under atmospheric pressure only, and so different from the others. Here are the conclusions: (1) All water examined showed some plumbosolvent action. Addition of carbon dioxide largely increased this.

The public water supplies of various towns were tested, but with alkaline water the amount of lead was small. The experiments of adding carbonic acid gas to water show the danger that lies in allowing exceptional natural waters highly charged with carbonic acid gas to come in contact with lead for even short periods.

(2) Filtration of the treated water (2 parts of ground chalk in 100,000) through sand did not appreciably alter its action on lead.

(3) When the water was alkaline to phenolphthalein the sand filters rapidly became clogged.

(4) When a new pipe is closed for seventeen hours about half the lead removed is dissolved in the first four hours.

If a house is left void for some time the use of the pipes for a few days will bring them to a normal condition.

A pipe is protected with coating about twice as quickly when it is in active use as when the water is standing.

(5) The average amount of lead dissolved from pipes increased with increase of time up to forty-four weeks.

(6) After a year the increased age of the pipe gave little or no increased protection.

(7) The amount of lead dissolved from alphabetical pipes in seventeen hours showed a notable reduction varying from four to seven months, but corked pipes did not show this reduction. The alphabetical pipes are never exposed to air and are always full of water; the corked pipe is periodically emptied, and the air is only kept out by corks.

(8) Pipes which had been in use for some years with hard water were as sensitive to soft water as others which had been used a much shorter time with soft water only.

(9) Different parts of one lead pipe yielded different amounts of lead to water in similar conditions.

Other things being equal it may be assumed that the larger the diameter of the lead pipe the less will be the amount of lead in solution.

(10) After a pipe has been closed for a month or more, overnight samples contained more lead than before closing, but regular use of the pipe for a week or less removed the excess.

(11) Corked pipes which have been used for some time with treated water show an immediate increase in the amount of lead dissolved when an untreated water is put in them.

(12) Figures obtained with corked pipes were neither identical nor parallel to those obtained with the alphabetical pipes.

(13) As a rule increased alkalinity of the water decreases the action on lead, but a hard water following a soft one may produce a temporary increase. On the occasions in which the alkalinity was higher than usual there was an increase in the amount of lead, possibly due to that water containing more carbon dioxide. In the other samples as the alkalinity decreases the lead increases and up to a point increase in alkalinity is accompanied by a decrease of the action of the water on lead pipes.

In some cases bad insulation of electrical fittings have allowed a small current to flow to earth by the water pipe and have resulted in very high figures for lead.

It must be admitted that not only have very serious epidemics of lead poisoning frequently occurred throughout Yorkshire and Lancashire, but from circumstances just examined there exists a glorious uncertainty as to how soon mild acidity may give place to strong plumbosolvent ability.

Lead absorbed into the system cannot circulate in the blood without inflicting injury on the kidneys and liver.

The cause of the sufferings resulting from arsenic in beer remained undiscovered for a long time, and the same thing is happening today in regard to lead poisoning from acid water in some places.

From the Guisborough medical officer of health's list of cases, from 1909 onward, the chief symptoms of those attacked were colic, 77; headache, 72; neuralgic pains, 79; anæmia, 78; blue line, 11. The Local Government Board inspector noticed that "any observer walking through the town was struck by the large proportion of persons met with who appeared anæmic, and this prevalence, added to the fact that it was often found in conjunction with other suspicious symptoms, gave the anæmia important diagnostic value. These cases presenting many similar features occurred in the town about the same time, and were not restricted to any one-age period, sex, class, or occupation, and lead was found in the urine in the majority, and some were very typical cases. The blue line was infrequent, and the other two medical practitioners had noticed these cases, and had not caused any tests to be made for the presence of lead in the urine, although the value of such tests was not disputed. In the house-to-house visitation fifty suspicious cases were discovered in 150 houses."

I have here given his own words, for his observations coincide exactly with my own as published in February, 1904; and Oliver says:—

"I have not the slightest doubt that there are many cases of illness attended by obscure symptoms of which no explanation can be given, and which are illustrations of atypical plumbism."

"Wristdrop" cannot, of course, escape notice any more than the paralysis of arsenical poisoning, but when lead is taken in small doses for a long time the symptoms may be slight, as in arsenic poisoning; the general health is so gradually deteriorated that disease from other cause is simulated.

Lead is known to have a cumulative poisonous action, so that even a minute quantity taken day by day accumulates in the system and remains in the organs of the body, and in acute cases iodide of potassium often given to eliminate the poison—in liberating the lead which has been deposited in the tissues—increases the

severity of the symptoms; it becomes redissolved, and fresh symptoms of saturnine poisoning reappear.

Iodide of potassium by redissolving lead which was lying in an insoluble form in the body has caused rapidly fatal toxæmia.

Communities may suffer from plumbism for many years before the cause is traced, so that the slightest contamination by lead should never be tolerated in water used for drinking purposes, and untreated acid water must infallibly act upon lead connection pipes, though of reasonable length, for as much as one-tenth of a grain per gallon has been found in water kept in contact with a lead pipe for half an hour. There can be no trifling with it.

Where the direct effects of lead poisoning have not been diagnosed *chronic illness has been noticed to disappear on the substitution of iron piping for lead*. (Rideal).

The presence of a very minute trace of lead in drinking water is sufficient to cause serious symptoms, and it cannot be too much insisted upon that if lead is introduced into the system in very small quantities, and for a long time, it is more likely to cause serious symptoms than when it is taken in larger doses and only on a few occasions. (Prof. Oliver).

There is not only an individual idiosyncrasy but there is an hereditary disposition to suffer from lead.

Women—particularly ill-nourished women—fall rapidly under the influence of this metal; and so also do many infants who are the peculiar victims of idiosyncrasy.

The peculiarity of lead poisoning by small doses is that it may develop so insidiously that a person may find himself in a serious state of health without much warning—the ruddy appearance of health, may, by degrees, be replaced by pallor.

Lead, in small doses, rapidly deranges metabolism, acts injuriously upon the eliminating organs, favours the retention of uric acid, etc., in the system, and induces nutritional changes. It leaves the body in larger quantities by the feces than by the urine and bile dissolves three times more lead than gastric juice. Deranged metabolism causes inert lead to become dissolved and to be reabsorbed.

Coming from a district where lead poisoning was unheard of and where teeth were excellent and anæmia rare, I suddenly came up against large communities of poisoned people in Northowram, which was due to excessive acidity of the Ogden reservoir water, and it

afforded me an excellent opportunity of acquiring valuable and highly interesting information, for I visited this township daily.

Some of the lead connection pipes were long and some were short, whilst there were no regulations in force as to the quality of the metal, or the length of the pipes. The result was, that whilst there were some very bad cases, there were also some very mild ones.

I examined a great number of gums, and found that the characteristic blue line was unmistakably marked in most of the severer cases which came under my notice, but not present in very many instances where the impaired general health and the anæmic condition clearly pointed to the fact that small doses of the lead were exercising their detrimental influence.

Of special interest to me was the appearance and symptoms of those who were taking small doses of lead, for in such the principal points observed were an ulcerated condition where the teeth join the gums, some impairment of the general health, gastric disturbance, constipation, so-called rheumatic pains, neuritis in various regions of the body, and such obscure symptoms as numbness and a sense of weakness in the limbs.

There seemed insensible gradations from mild anæmia alone to the well-known symptoms of plumbism, viz., a blue line on the gums, drop-wrist, etc. This is what occurred in the recent arsenical poisoning, the mildest cases being unrecognised, and I was also reminded of an outbreak of typhoid fever in my Lancashire practice. Of the seventy or eighty cases of this disease I visited, some were very well marked, whilst others would not have been diagnosed but for the existence of the disease in epidemic form.

An error in diagnosis as to the cause of certain cases of anæmia arises in this way. Such symptoms as "drop-wrist" or "blue line on the gums" may be looked for, whereas a weakened state of health and anæmia may exist, as was the case in this outbreak of plumbism, long before such serious symptoms can occur. Basophilia has not the diagnostic importance which many claim for it. The blue line may not be present if there are no decaying teeth or if a tooth-brush is used, but the true Burtonian blue line is not readily removed, for it is due to a deposit of lead sulphide inside the cells of the deeper layers of the gum. A blue line may occur in persons taking Bismuth

or using charcoal as a tooth-powder. Accompanied by other symptoms a blue line is a valuable sign.

In ordinary cases these symptoms follow, as a rule, a period (which may be a long one) of malnutrition, dyspepsia, and constipation; but in persons taking very small doses for a long period they may never appear at all, but instead there will be anæmia, constipation, and dyspepsia.

It is well known that bone marrow as a blood-cell-forming agent is seriously impaired early on in the course of plumbism. So also in the recent cases of chronic arsenic poisoning, such symptoms as debility, anæmia, gastro-intestinal irritation, tingling or numbness were disregarded or attributed to other causes because more acute symptoms were not present.

The frequency with which long lengths of lead connection-pipes are used is astonishing, and where these exist I have often noticed that anæmia is present.

In many parts of Yorkshire anæmia is remarkably prevalent; it occurs amongst the rich and poor alike, and when treated returns.

This was obviously due to circumstances which did not obtain in my Lancashire experience, where moorland water was not used, though I entirely failed to find any important difference in the habits of the people in the two counties.

It is very remarkable how some strong, plethoric girls readily lose their ruddy complexions.

Servants, too, very frequently break down with anæmia, and I have heard of some regaining their healthy appearance on returning to their homes.

This cannot be due to overwork, as often whole families are noticed to be anæmic, and it must be confessed that the treatment is disappointing.

Lack of proper exercise, fresh air and improper food are the ordinary causes of anæmia, but these causes do not apply in the districts to which I allude, nor can the girls be compared with the ill-fed, overworked girls of large towns, who are confined all day in close, badly-lighted rooms.

Gastric cases and constipation are far more numerous in these districts, than in my Lancashire experience, and there can be no doubt that lead in small doses interferes with the functional activity of the stomach, liver, and kidneys. Albuminuria may be met with in the early stages of plumbism and in colic.

Minute quantities of lead can adversely affect the heart (Oliver).

Another very decided object lesson was presented in the appearance of the teeth.

In Yorkshire the teeth are in a notoriously bad state, and very frequently associated with ulceration, and retraction of the gums; they very soon decay after the operation of cutting them off.

A persistent suppurative condition in the gums and around carious teeth by constantly swallowed pyogenic microbes becomes a serious and often unsuspected cause of gastric disturbance by the setting up of a septic gastritis. How terribly common gastric ulcers are!

The state of the teeth demands attention, for it must be admitted that this condition of the teeth and gums produces physical degeneration.

How can good physique be attained in adults when the teeth are decayed and the gums ulcerated in youth?

This was quite contrary to my Lancashire experience, and under similar habits of the people. Working under detrimental conditions in factories has nothing to do with it for as certifying factory surgeon I constantly see the early stages of degenerating teeth in children of 12-13 who have never done any work.

True it is that the "staff of life" is made of white flour from which has been abstracted very much of the nutritious value of the grain, but the parents of these children are earning very good wages so that the little ones have variety and abundance of food.

Medical men who have practised in a district during a bad epidemic of plumbism are well aware that pregnant women drinking lead-polluted water very readily abort, though the true cause is often overlooked.

The frequency with which this happens where there is much acidity in the public water supply is serious, but even where the acidity is slight can this tendency be left out of calculation in view of the cumulative character of lead?

To this same detrimental influence may perhaps be credited some cases of menorrhagia met with.

That the alcoholic habit strongly predisposes to the subtle influences of lead is very true.

If an individual be predisposed to gout small doses, long continued, of lead are sometimes sufficient to produce *gouty symptoms*.

Arsenic never possessed a monopoly of peripheral neuritis, which still often comes under notice; indeed, the nervous system is, as I have stated, peculiarly prone to be affected by lead.

It is not to my purpose to speak of the graver results of lead poisoning, such as paralysis, insanity, Bright's disease (of which disease there were 671 deaths in 1913 in the West Riding), etc., which are well known; but, bearing in mind the cumulative property of lead, it is not very pleasant to realise that great numbers of people in this country are drinking acid moorland water possessing plumbo-solvent ability in varying degree.

Do not these changes, slowly induced, show that the destruction of the functional activity of the organ of the body by even very small doses of such a poisonous metal cannot be inconsiderable?

Though the water from short pipes may contain no lead, and that from long ones one-tenth of a grain per gallon producing obvious symptoms of lead poisoning, what about those using medium lengths? Lead is a cumulative poison. Must we be contented with water of slight acidity? I repeat, thirty-five out of fifty-eight reservoirs examined by Dr. Houston were found acid, and when a change in the relative amounts and quality of the constituent waters takes place, a temporary acquisition of lead-dissolving property by the whole water service may suddenly take place. Most poisons act quite differently upon one body to what they do on another.

One milligramme of lead taken daily for several months will cause plumbism. Cases illustrating the poisonous doses of lead are quoted by Dr. De Chaumont (in which water contained one-twentieth of a grain per gallon); Dr. Hunter, of Pudsey (one-fifteenth to one-twentieth); Dr. Angus Smith (one-hundredth grain), Dr. Adams (one-hundredth grain), Dr. Sydney Ringer (one-fiftieth grain), and Allbutt (0.0028 grain).

Of the family of Louis Philippe, at Claremont, 34 per cent. who drank the water, which contained seven-tenths of a grain per gallon, suffered from plumbism.

Nor is it necessary that drinking water should contain lead in solution, for it may contain a large quantity of lead in a precipitated form and none in solution, and this may be deposited upon vegetables boiled in it.

Shelf was as bad as Northowram, and later on Hipperholme was attacked, so I have watched this subject for twenty years, and witnessed the ever-increasing evidence charged against the insidious action of our vast water supplies in disseminating poison through lead pipes.

Adulteration of milk or other food is not permitted. Water is quite as important! To ask the public to run the pipes empty is precarious and costly.

The use of lead pipes is prohibited in certain continental countries and in Austria even galvanised iron pipes are not allowed. Why is their use permitted in England? As I have stated there are some perfectly satisfactory pipes on the market. One such has been in my house fifteen years and is as satisfactory as when first used, but it was put in by a competent man. These pipes are now, however, fool proof—any plumber can put them in without fear of any corrosion.

Why cannot at least a limit to the length of a lead pipe be fixed by the Local Government Board? Here at Hipperholme our bye-laws impose a limit of fifteen yards.

Every water authority should employ a competent analyst for a sufficient period to carry out differential experiments, so that not only the widest possible variations but also the best possible treatment of the particular water concerned may be fully ascertained. Capacity to take up lead varies with the seasons of the year, also with the weather, and besides the protective material laid down in a filtering bed is being gradually washed away or its influence weakened.

Why cannot the Local Government Board appoint a whole-time expert to examine water supplies and advise water authorities—the pollution of drinking water is quite as important as river pollution.

In the meantime let every authority do its duty fearlessly and thoroughly, for sanitary science must leave off boasting of progress in public health so long as this very serious question remains a menace to the health of the people.

IMPORTANT TO MEMBERS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

PROVINCIAL MEETING—CHANGE OF DATE.

The Provincial Meeting of the Society will be held at Hereford, on Saturday, June 5th, and not as previously announced. The arrangements made up to the present include a discussion on "Milk-borne Diseases," to be introduced by Drs. J. B. Wilkinson and T. W. N. Barlow. The members and their friends will be entertained to luncheon, and visits will be made to the Garden City and other local attractions. The Very Rev. the Hon. J. W. Leigh (Dean of Hereford) will conduct the members through Hereford Cathedral.

A NOTE ON THE ANTI-SERUM TREATMENT OF CEREBRO-SPINAL MENINGITIS.

By C. W. HUTT, M.A., M.D., Cantab., D.P.H., Oxford.

IN view of the high fatality in recent epidemics of cerebro-spinal meningitis—about 70 per cent.—it would seem advisable that adequate trial should be made of any therapeutic agent which has been found successful. Unsatisfactory results were obtained with the anti-serum* used for the earliest cases of cerebro-spinal meningitis during the recent prevalence of the disease in the South of England; it would, however, be unfortunate if this experience were to discourage the use of anti-meningococcic serum which has proved of considerable value both during outbreaks and at other times in the United Kingdom, especially when used intra-theccally.

After an unfavourable experience of the usefulness of three varieties of anti-meningococcic serum—Kolle and Wasserman's, Ruppel's and that supplied by Burroughes, Wellcome & Co.—during the first four months of the epidemic in Belfast in 1907, the death-rate in the case of 275 patients being 72 per cent., Dr. A. Gardner Robb made use of the anti-serum of Flexner and Joblin, with the result that of 106 sufferers death occurred in only 31 (29·2 per cent.), "every case received into the hospital being thus treated and all fatal cases being included in this number even when death resulted half-an-hour after the first injection." (Dr. A. Gardner Robb).

Dr. N. Percy Marsh and the late Dr. O. T. Williams treated (circ. 1908) 14 children suffering with cerebro-spinal fever with Flexner's and Joblin's anti-serum; their ages varied from three months to four years; seven out of fourteen recovered. Although Dr. Flexner had shown that the mortality among children from this disease is greatest under one year of age, five of the twelve children under one year of age recovered; seven out of fourteen.

Dr. Marsh informs me that he has obtained satisfactory results from the use of Dopter's anti-serum made by the Pasteur Institute.

Dr. William C. Gunn treated eight cases of cerebro-spinal meningitis in Ruchill Hospital, Glasgow (circ. 1913), with anti-meningococcic serum—of four patients treated with Flexner's (and Joblin's) anti-meningococcic serum

* The anti-serum used was not that of Flexner and Joblin.

obtained from New York (Board of Health) three recovered and one died; three patients suffering from the chronic type of the disease were treated with an anti-meningococcic serum from another source, the Lister Institute, but all died. It should be added that in all these cases on account of the absence of complement from cerebro-spinal fluid the anti-serum was re-activated at the time of injection by the addition of fresh normal human serum from a healthy person.

Lieutenant Norman P. Laing, R.A.M.C., in a letter to the *Lancet* (page 465 of the issue February 27th, 1915), mentions five cases of cerebro-spinal meningitis under the care of Dr. T. A. Johnston treated at the Leicester Royal Infirmary with Flexner's meningococcic serum as well as with fresh human serum and soamin; all the patients recovered.

The results obtained by Drs. J. R. Currie and A. S. M. Macgregor from the use of four sera (none of them Flexner's and Joblin's anti-serum) on different patients, 105 being treated, were not very markedly favourable to the use of the anti-sera, four being used, viz., Wasserman's, Ruppel's, Kolle's and that of Burroughes, Wellcome & Co.'s. They, however, were able to demonstrate that of the patients who survived the first ten days of the illness those treated with anti-serum recovered in greater numbers; they considered the difference was sufficiently great to be the result of the treatment and not merely accidental. Of 54 patients treated with anti-serum and who survived the first ten days of the illness, 29 recovered, i.e., 53·7 per cent., whereas of 87 patients surviving a similar period and not treated by anti-serum, 46 only recovered, i.e., 52·9 per cent.

Although it is obvious that the strain of meningococcus present in an individual patient may not be the same as that used to produce the anti-serum, it may reasonably be concluded that in all cases of cerebro-spinal fever an anti-meningococcic serum should be used; also that the anti-serum of Flexner and Joblin* should receive an adequate trial.

* To be obtained from the New York Board of Health.

Some Observations on the Recent Outbreak of Cerebro-Spinal Fever in Belfast. Dr. A. Gardner Robb, *British Medical Journal*, October 26th, 1907.
Report by Dr. A. Gardner Robb on the same subject to Ulster Branch of British Medical Association, June, 1909.
The Treatment of Epidemic Cerebro-Spinal Fever by Intra-Spinal Injections of Flexner's and Joblin's Anti-meningitis Serum. Dr. A. Gardner Robb, *British Medical Journal*, February 15th, 1908.
The Treatment of Cerebro-Spinal Meningitis in Children with Flexner's and Joblin's Anti-Serum. Drs. Percy Marsh and Owen T. Williams, *Liverpool Medical-Chirurgical Journal*, July, 1909.
Notes on the (Anti-Serum) Treatment of Cerebro-Spinal Meningitis. Dr. William C. Gunn, *Glasgow Medical Journal*, October, 1912.
The (Anti-Serum) Treatment of Cerebro-Spinal Fever in the City of Glasgow Fever Hospital, Belvidere, between May, 1906, and May, 1908. Drs. J. R. Currie and A. S. M. Macgregor, *Lancet*, October, 1908.
Letter in *Lancet*, pp. 464 and 465, February 27th, 1915. By Lieut. N. P. Laing, R.A.M.C.

CIVIL APPOINTMENTS.

DR. WILLIAM ANGUS has been appointed acting medical officer of health of the city of Leeds to fill the vacancy caused by the retirement of Dr. Spottiswoode Cameron.

DR. ETHEL CASSIE, Edinburgh, has been appointed temporary medical officer of health and school medical officer of Clackmannanshire, during the absence of Dr. Finlator, who has joined the R.A.M.C.

MR. DUDLEY W. COLLINGS has been appointed medical officer of health of the borough of Southwold.

DR. G. H. DART, tuberculosis officer of Greenwich, has been appointed to act as deputy medical officer of health of that borough during the absence of Dr. E. G. Annis, the medical officer of health, who is on military service.

DR. A. B. DUNNE has been appointed medical officer of health of the newly-constituted urban district of Adwick-le-Street.

DR. R. FRASER, deputy medical officer of Derby, has been appointed medical officer of health of Chesterfield.

DR. L. A. HYNES, of Plymouth, has been appointed temporary assistant school medical officer of Torquay during the absence of Dr. Ellis on war service.

DR. W. LANGRAN has been appointed medical officer of health of the newly-formed Axminster U.D.

DR. A. F. MACLEAN has been appointed chief school medical officer of the county of Aberdeen.

DR. ANNIE R. McKAIL has been appointed temporary assistant school medical officer of Derby.

DR. L. C. NASH has been appointed medical officer of health of Shildon U.D.

DR. WALTER BROCK PARSONS has been appointed tuberculosis officer of the County Borough of Bournemouth.

DR. LAWRENCE PICK has been appointed assistant school medical officer of Barry.

DR. ROLAND SINCLAIR has been appointed assistant school medical officer of the county of Aberdeen.

DR. R. H. STRONG has been appointed temporary assistant school medical officer of Edmonton.

DR. A. F. WILSON, the medical officer of health, has been appointed tuberculosis officer of Stirling.

MILITARY APPOINTMENTS.

DR. F. J. ALLAN, medical officer of health of the city of Westminster, holds a commission as Captain in the R.A.M.C. (T.F.).

DR. H. E. CORBIN, medical officer of health of the borough of Stockport, has been promoted to major in the R.A.M.C.

DR. D. S. DAVIES, medical officer of health of Bristol, now Lieut.-Colonel in the R.A.M.C. (T.F.).

DR. F. S. HAWKS, school medical officer to the Essex Education Committee, has received a commission in the R.A.M.C.

DR. A. M. HEWAT, tuberculosis officer and assistant medical officer of health of the borough of Preston, has been appointed bacteriologist to the Western Command (which comprises that part of Lancashire lying north of the Ribble and the counties of Cumberland and Westmorland as far as Carlisle), for the purpose of investigations in connection with cerebro-spinal meningitis among the troops in the North Lancashire district.

DR. W. B. HILL, medical officer of health of the Selby Urban and Selby, Tadcaster, and Riccall Rural Districts, has joined the R.A.M.C.

DR. W. M. HOLT, medical officer of health and school medical officer of Malton U.D., has received an appointment on the staff of the War Office in the South of England.

DR. A. E. JERMAN, medical officer of health of Erith U.D., who held the rank of Major in the R.A.M.C. (T.F.), has been promoted to the rank of Lieut.-Colonel in the 4th Field Ambulance, 2nd London Division.

DR. HERBERT JONES, President of the Society of Medical Officers of Health, has been promoted from the rank of Major to Lieut.-Colonel (temporary) in the R.A.M.C. (T.F.), while serving with the South Wales Mounted Brigade Field Ambulance.

DR. A. A. MUSSEY, assistant medical officer of health of Liverpool, now Major in the R.A.M.C., on the staff of the Merchants' Hospital.

DR. C. S. THOMSON, medical officer of health of Workington, has received a commission in the R.A.M.C.

DR. W. G. WILLOUGHBY, medical officer of health of Eastbourne, now Major in the R.A.M.C. (T.F.).

REVIEWS.

THE CHEMICAL EXAMINATION OF WATER, SEWAGE, FOODS, AND OTHER SUBSTANCES. By J. E. Purvis, M.A., University Lecturer in Chemistry as applied to Hygiene and Public Health, Cambridge; and T. R. Hodgson, M.A., Public Analyst for the County Boroughs of Blackpool and Wallasey. Pp. 228. Cambridge University Press, 1914. Price 9s. net.

This is one of the volumes dealing with various subjects connected with public health which are published by the Syndics of the Cambridge University Press, and the authors state in their preface that it is intended for the use of students who are preparing for diplomas and degrees in public health, and for others who are studying the chemistry of water, foods, etc. The statement by the authors that the volume is intended for those who are attending courses of instruction explains the fact that they present the subject in a form which would often be found insufficient to the needs of the student who has not skilled advice always at hand. The description of the methods of water analysis is, for instance, condensed into twenty pages; and, to give one further instance, the calculation of the carbonic acid in the atmosphere to a percentage at the standard temperature and pressure is shown as a formula, without any explanation to assist the student. The book deals with the examination of water, sewage, sewage effluents, food, beverages, air, rag-flock, disinfectants, urine, etc.; and if the work is only to find a place in laboratories which are well equipped and staffed the absence of illustrations is not a serious drawback.

It follows that the knowledge and experience of the authors have resulted in the production of a work which is sound and accurate, and which may be confidently recommended to those for whom it is intended. The considerable number of typical analyses introduced to illustrate the variations which may occur in the composition of different articles is a useful feature of the book; and the full references given in the text, together with a short bibliography of some of the more important works upon the subjects under treatment, is noteworthy.

THE MINOR HORRORS OF WAR. By Dr. A. E. Shipley, F.R.S., Master of Christ College, Cambridge. pp. 166. 64 illustrations. 1s. 6d. net. in paper cover or 2s. net in cloth. Messrs. Smith, Elder & Co. London, 1915.

To the readers of PUBLIC HEALTH it will almost suffice to say, by way of review, that this small book embodies the series of articles by Dr. Shipley which have already appeared in the *British Medical Journal*.

The author states "that the contents of this little book hardly justify its title." Certainly the

title scarcely suggests a limitation of treatment to the "little animals which in times of war may make or unmake an army corps"; nor would it be expected to include reference to *demodex folliculorum*. The louse, the bed bug, the flea, the flour-moth, the fly, the mite, the tick and the leech are interestingly, at times amusingly, and always instructively, discoursed upon in a well illustrated book.

What practical advice is given is of course sound, but the book would have been more useful to practical sanitarians if a fuller statement had been made upon the best practical methods of dealing with each of these "minor horrors." The medical officer of health will find but little guidance in this respect. Surely mosquitoes should have been included among the minor horrors; and one should not be referred to another publication for information upon how to discourage and reduce the prevalence of flies. Doubtless the book's chief claim upon the medical reader is the treatment of the subject from the zoological standpoint by one who is an authority upon such matters.

WORDS TO THE WISE.

THE Health Department of the City of Boston, U.S.A. publishes the following "Words to the Wise," for the benefit of the public:—

A place for everything and everything in its place.

The back yard and the cellar are poor places to allow accumulations of filth. Let the spring house cleaning embrace the whole premises. The city teams will carry away the dirt if you will collect it. A few hours spent in cleaning up pays big dividends in satisfaction and self-respect.

Help to keep the city clean.

Do not throw garbage, ashes or rubbish into the back yard, upon the sidewalk or street.

Put all garbage, ashes and rubbish into separate barrels. Do not fill the barrels too full and keep tightly fitting covers on the garbage receptacles.

Mosquitoes will soon begin to breed. They breed in stagnant pools, and are dangerous, since certain species are able to carry malaria from one person to another. They seldom fly far from their breeding places. Prevent trouble by not allowing stagnant water on your premises.

Flies breed in filth, particularly manure. Keep the stable and surroundings clean. Manure should be kept in covered galvanized iron barrels and removed every forty-eight hours.

Flies are a nuisance, and are carriers of disease germs. They have been proven guilty of carrying typhoid fever and other diseases. No filth means no flies. Clean up and keep clean.

Have you cleaned up and does your neighbour refuse to do likewise? Notify the Board of Health and let it use its powers. All such notices to the department are strictly confidential.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED 1888.
INCORPORATED 1892.

AN Ordinary Meeting of the Society was held at the Offices of the Society, No. 1, Upper Montague Street, Russell Square, London, W.C., on Friday, April 16th, 1915, at 5 p.m. Present: Dr. Herbert Jones, President (in the chair), and Drs. E. H. Snell, T. Ridley Bailey, Sidney C. Lawrence, Charles Porter, J. T. C. Nash, George F. Buchan, P. Caldwell Smith, A. Wellesley Harris, H. Beale Collins, John Tubb-Thomas, J. B. Wilkinson, W. G. Willoughby, A. Mearns Fraser, J. W. Hembrough, H. Handford, John Taylor, George H. Dupont, T. W. N. Barlow, Wm. Robertson, R. Veitch Clark, W. A. Bond, T. Orr, Louis C. Parkes, H. R. Kenwood, A. Ashkeny, Hugh Woods, George P. Bate, R. L. Wilcox, J. B. Howell, D. L. Thomas, R. J. Ewart, B. C. Stevens, T. Shadick Higgins, A. Ball, Percy W. Spaul, and Randle Harper (Associate).

Minutes.—The minutes of the previous ordinary meeting, held on Friday, March 12th, 1915 (*vide* PUBLIC HEALTH, April, 1915, page 170), were taken as read, were approved and duly signed by the Chairman.

Correspondence.—Dr. T. W. NAYLOR BARLOW (hon. secretary) said he had received letters from Drs. A. A. Mussen, H. H. I. Hitchon and R. A. Glegg, regretting their inability to be present.

A letter was also read from the widow of the late Dr. E. C. Seaton, thanking the Society for the vote of condolence passed at the previous meeting.

Election of Fellows.—Dr. John Brownlee, M.A., M.D., D.Sc., D.P.H., Guilford Street, Russell Square, London, W.C., and Dr. James Aspinall Marsden, M.R.C.S., L.S.A., L.S.Sc., Harrock, Lightcliffe, near Halifax, were balloted for and unanimously elected Fellows of the Society.

Nominations for Election.—Several nominations for election to the Fellowship of the Society were submitted.

Election of President for Session 1915-1916.—THE PRESIDENT said that the procedure for the election of President for the forthcoming Session was that nominations were sent into the Council by the Branches, and it was the duty of the Council to select one name, and submit it to a general meeting for election to the Presidency. The Council had met that afternoon and had selected the name of F. J. Allan, F.R.S.E., M.D., D.P.H., and it was now the duty of the meeting to proceed to election by ballot. Dr. S. C. LAWRENCE moved that the President be asked to ballot on behalf of the Society, Dr. TUBB-THOMAS seconded, and the motion was agreed to. The PRESIDENT, having duly balloted, announced, amid applause, that Dr. Allan had been unanimously elected as President of the Society for Session 1915-16.

Dr. WILLIAM ROBERTSON then read a paper entitled "The Personal Equation in the Vital Statistics of a Community,"* and a discussion took place, in which the following members joined, viz.: The President and Drs. H. R. Kenwood, Caldwell Smith, Charles Porter, A. Mearns Fraser, R. Veitch Clark, and W. A. Bond.

Dr. Robertson replied, and the meeting adjourned.

Home Counties Branch.—A meeting was held at 1, Upper Montague Street, Russell Square, on March 18th, 1915. The minutes of the last meeting were duly read and approved.

The PRESIDENT moved that the Secretary be instructed to convey to Mrs. Seaton the sympathy of the Branch on the death of her husband, Dr. Seaton, a former president of this Branch and of the Society.

MR. SYDNEY STEPHENSON, F.R.C.S., then gave a most instructive paper on "Some Questions Arising from the Notification of Ophthalmia Neonatorum."* The subsequent discussion was taken part in by all the members present, and the meeting unanimously desired the Hon. Secretary to endeavour to have the paper printed in PUBLIC HEALTH.

A meeting of the Home Counties Branch was also held on April 15th, 1915, at Brook House, Southgate, by kind invitation of Dr. Harry Corner, the well-known authority on the subject of mental deficiency.

Present: Dr. Lawrence (President), Drs. Beale Collins, Roughton, Buchan, Sanders, Laird, Veitch Clark, Linton, Robinson, Shadwell, Thomas, Tate, Ball, Kirkhope, Chubb, Seekings, Warren, Cook, J. J. Clarke, Gruggen, Berry, Paterson, and Dupont.

Visitors: Drs. Sherrett and Eaton.

The minutes of the last meeting, held on March 18th, were duly read and confirmed.

The PRESIDENT read a letter from Dr. Strain regretting that it would be necessary for him to resign his position as Hon. Secretary to the Branch, as he had been appointed to a commission in the Royal Army Medical Corps.

The Branch accepted the resignation and expressed their appreciation of Dr. Strain's services as Hon. Secretary and of his patriotic conduct.

Dr. BUCHAN proposed, and Dr. BEALE COLLINS seconded, that Dr. George H. Dupont, of Twickenham, be elected Secretary to the Branch for the remainder of the year, and this was duly carried.

Dr. HARRY CORNER then gave an address on the various degrees of mental deficiency, which he illustrated by the demonstration of several cases.

The meeting was unusually well attended, and on the motion of Dr. SANDERS, seconded by Dr. LAIRD, a hearty vote of thanks was accorded to Dr. Corner for his address and kind hospitality.

*To be published in a subsequent number.

North-Western Branch.—A meeting was held at the Grosvenor Hotel, Manchester, on Friday, April 23rd, 1915. Present: Dr. H. H. I. Hitchon (in the chair), Drs. J. L. Stewart, Dearden, Marsden, Kingsford, Daley, Buckley, Wilkinson, Wheeldon, A. W. Frew, Welsh, W. Stewart, Stalker, Alice Stalker, Jessel, Radcliffe, Banks, Cates, R. H. W. Fisher, Ferguson, Middleton-Hewat, Gee, Leigh, and Barlow (acting hon. sec.). Apologies for inability to be present were received from Drs. Mussen and Meredith Young.

The minutes of the previous meeting were read and confirmed.

The ACTING HON. SECRETARY reported on two matters dealt with at the last meeting of the Council of the Society in which the Branch was interested.

DR. DEARDEN mentioned a bulletin of the Bureau of Entomology of Washington, U.S.A., which gave an account of experiments having for their object the discovery of substances which will destroy the larvæ of flies without injuring the manure, from which it appeared that while there were several substances which were efficacious in destroying the larvæ, these substances also destroyed vegetation. The best substance which had the advantage of destroying the larvæ of flies without injuring vegetation was borax in the proportion of 62 lb. to 10 cubic feet of manure, and about two gallons of water sprinkled over the heap. This method is most efficacious when used on fresh manure (*vide* PUBLIC HEALTH, January, 1915, p. 95).

DR. J. L. STEWART then read his paper on "Pulmonary Tuberculosis in Children of School Age." An interesting discussion followed, in which the following took part: Drs. Marsden, Middleton-Hewat, Jessel, Cates, Stewart-Stalker, Kingsford, and Radcliffe.

DR. STEWART having replied, the meeting terminated.

School Medical Service Group.—A meeting was held at the Society's Offices, 1 Upper Montague Street, Russell Square, W.C., on Saturday, April 10th. The financial position of the past year was considered and officers were elected. The reply of the Council of the Parent Society to the petition, signed by 70 members of the Society and 20 intending members, for the formation of a School Medical Service Branch was considered, and a resolution was passed with the object of improving the representation of the Group on the Council. A report prepared by the National Union of Teachers and submitted by the B.M.A., to regulate the work of medical officers in the schools was considered, but on account of the disorganisation caused by the war and importance

of the suggestions made the report was postponed. The recent statement of Sir Alfred Keogh, Director-General, Army Medical Service, War Office, and the recent letter of the Board of Education as to the urgent need for more medical officers was considered, and it was unanimously resolved "that the School Medical Service Group notices the grave appeal issued by the War Office for more medical officers, and urges members of the service to respond to this appeal." Members of the service having any difficulty in obtaining leave of absence or a substitute should apply to the Hon. Secretary of Group.

A joint paper by DRs. C. W. HUTT and G. FINCH was read on "School Medical Service Work and the British Army," pointing out the relation of such work to the physique of the army.

The Hon. Treasurer of the School Medical Service Group would be glad to receive the original levy of 7/- from the few members of the Group who have not yet forwarded it.

RECENT PUBLIC HEALTH LITERATURE.

Lead, White.

TANNER, (SIR H.). White lead and its disease for painting. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 423. Discussion, p. 429.

Meat Analysis.

WEINZIRL (J.) and NEWTON (E. B.). Bacteriological methods for meat analysis. *Amer. Journ. Pub. Health*, 1914, iv, 408.

Milk Supply.

ARCHIBALD (R. W.). Sanitary milk and how to get it. *Pediatrics*, 1914, xxvi, 543.—DELEPINE (S.). The milk supply as a causal factor in relation to tuberculosis. *Journ. State Med.*, 1914, xxii, 671.—KOPLIK (H.). The history of the first milk dépôt or Gouttes de Lait with consultations in America. *Journ. Amer. Med. Assoc.*, 1914, lxviii, 1574.

Mosquitoes.

LICEAGA (E.). How war has been waged in Mexico against the mosquito. *Amer. Journ. Trop. Dis.*, 1914-15, ii, 118.

National Insurance Act.

NIVEN (J.). The effect of the National Insurance Act, 1911, on public health administration. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 300.—YOUNG (M.). The effect of the National Insurance Act on public health administration. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 309, Discussion, p. 314.

Notification of Disease.

BAHADUR (R. K. C. B.). Notification as a means of prevention of the spread of infectious diseases. *Indian Journ. Med. Research, Suppl.*, 1914, iii, 34.

Occupations.

OLIVER (SIR T.). The rise and progress of factory legislation. *Journ. State Med.*, 1914, xxii, 472.—SELLERS (A.). Blood changes in lead workers. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 328. Discussion, p. 334.—WARREN (B. S.). Industrial conditions; their relation to the public health. *Pub. Health Repts.*, Wash., 1914, xxx, 1348.

Occupations, Diseases of.

COLLIE (SIR J.). Some injuries of the upper extremities in industrial workers. *Journ. State Med.*, 1914, xxii, 683.—EDSALL (D. L.). The relation of industry to general medicine. *Boston M. and S. Journ.*, 1914, clxxi, 659.—HASTINGS (C. J.). Industrial disease and industrial hygiene. *Canad. M. Assoc. Journ.*, 1914, iv, 782.—HOFFMAN (F. L.). The relation of Insurance Companies to industrial diseases. *Boston M. and S. Journ.*, 1914, clxxi, 662.—LINENTHAL (H.). Occupational diseases as a public health problem. *Boston M. and S. Journ.*, 1914, clxxi, 668.

Oriental Diseases.

BREINL (A.). The distribution and spread of diseases in the East. *Journ. Trop. Med.*, 1914, xvii, 293.

Pellagra.

SILER (J. F.), GARRISON (P. E.) and MACNEAL (W. J.). Further observations of the Thompson-McFadden Pellagra Commission upon the epidemiology of pellagra. *Pacific Med. Journ.*, 1914, lvii, 419.—LOWERY (J. R.). Pellagra. *Medical Record*, N.Y., 1914, lxxxvi, 378.—BRENGLE (D. R.). Pellagra in Minnesota. *Journ. Amer. Med. Assoc.*, 1914, lxviii, 1,157.

Paper.

RIDEAL (S.). Paper as a hygienic material for home articles in daily use which require frequent washing. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 522.

Plague.

CONNOR (MAJOR F. P.). Plague jottings. *Indian Med. Gaz.*, 1914, xlix, 255.—SCHOBEL (O.). Bacteriological observations made during the outbreak of plague in Manila in 1912. *Philippine Journ. Sci.*, 1914, B. viii, 409.—EASTWOOD (A.) and GRIFFITH (F.). Report to the Local Government Board on an enquiry into rat plague in East Anglia during the period July-October, 1913. *Journ. of Hygiene*, 1914, xiv, 285.—STRICKLAND (C.). The incidence of plague in Europe, with special reference to the rôle played by the rat. *Lancet*, 1914, ii, 1141.

Pneumonia.

CLARK (R. V.). Pneumonia from the point of view of public health. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 249. Discussion, p. 358.

Poliomyelitis.

FRANCIS (E.). An attempt to transmit poliomyelitis by the bite of *Hyperosia irritans*. *Journ. Infect. Dis.*, 1914, xv, 1.

Public Health.

FERRELL (J. A.). Public health work as a career. *Journ. Amer. Med. Assoc.*, 1914, lxviii, 653.—HODGETTS (C. A.). Health problems in Canada. *Canad. Pract. and Rev.*, 1914, xxxix, 527.—McCULLOUGH (J. W. S.). Public Health in Ontario. *Canad. Pract. and Rev.*, 1914, xxxix, 553.—MACKENZIE (W. L.). State medicine problems of the coming ten years. *Journ. State Med.*, 1914, xxii, 528.—PATERSON (REV. W. P.). The public health crusade. *Journ. State Med.*, 1914, xxii, 535.—PRIESTLEY (J.). Recent public health work. *Practitioner*, 1914, xciii, 409.

Race Degeneracy.

KELLOG (J. H.). Relation of public health to race degeneracy. *Amer. Journ. Pub. Health*, 1914, iv, 649.

Respiratory Disease.

BARLOW (T. W. N.). Administrative measures for the control of respiratory diseases other than phthisis. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 345.

Rinderpest.

BAYNTON (W. H.). Experiments on the cultivation of rinderpest virus as described by Baldrey. *Philippine Journ. Sci.*, 1914, ix, B. 259.

Sanatoria.

BAILEY (W. C.) and MACCORISON (C. C.). A scheme for promoting efficiency in State sanatoria. *Boston M. and S. Journ.*, 1914, clxxi, 381.

Sanitation of Towns.

HEWLETT (P. R.). Short descriptive note on Lucknow City sanitation. *Indian Journ. Med. Research, Suppl.*, 1914, v, 109.

Scarlet Fever.

DICK (G. F.) and HENRY (G. R.). Anaerobic cultures in scarlet fever. *Journ. Infect. Dis.*, 1914, xv, 85.—KER (C. B.). Recent work on scarlet fever. *Practitioner*, 1914, xciii, 400.

School Children.

WILLIAMS (A. E.). The medical treatment of school children in rural districts. *Journ. State Med.*, 1914, xxii, 602.—WINCH (W. H.). Some new reasoning tests suitable for the mental examination of school children. *Brit. Journ. of Psychol.*, 1914, vii, 190.—WINSLOW (P. V.). The medical inspection and examination of school children. *Albany Med. Ann.*, 1914, xxxv, 331.—BROWN (E. F.). The health supervision of the school children of

New York City. *Med. Rev. of Reviews*, N. Y., 1914, xx, 471.—ELDERTON (E. M.). Height and weight of school children in Glasgow. *Biometrika*, 1914, x, 288.—KENWOOD (H. R.). The school and the home. *Journ. State Med.*, 1914, xxii, 689.—PRIESTLY (J.). The true aim and purpose of the routine inspection of children in school. *Journ. State Med.*, 1914, xxii, 693.

Schools.

TORBETT (J. W.). Clinical observations on the medical inspection of schools. *Pediatrics*, N. Y., 1914, xxvi, 372.—HOGG (G. H.). The eye at school. *Med. Journ. of Australia*, 1914, i, 55.—BIRAM (F. S.) and FLETCHER (W. B.). Some recent developments in school building. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 431.—ROBERTS (E. T.). Medical inspection in relation to special schools. *Journ. State Med.*, 1914, xxii, 584.

Sewage.

KERSHAW (G. B.). The sampling of sewage and other liquids. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 456. Discussion, p. 486.—SILER (J. F.), GARRISON (P. E.), and MACNEAL (W. J.). The relation of methods of disposal of sewage to the spread of pellagra. *Archives of Internat. Med.*, 1914, xiv, 453.—WATSON (J. D.). Recent experiments in sewage treatment, with the view of eliminating objectionable smell. *Journ. Royal Sanit. Inst.*, 1914, xxxv, 449.—AIKMAN (D. W.). The disposal of sewage sludge. *Indian Journ. Med. Research*, Suppl., 1914, iii, 206.

Sewers.

BANKS (H.). New sewage and storm-water pumping plant at Blackpool. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 489.—HILL (J. B.). A short note on sewers. *Indian Journ. Med. Research*, Suppl., 1914, iii, 202.—MUNCE (J.). Outfall sewer construction, with special reference to Belfast. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 477.

Sexual Hygiene.

LA CHARD (MRS. T.). The instruction of school children in matters of sex. *West Canada Med. Journ.*, 1914, viii, 213.

Small-pox.

GREELEY (H.). The organism of small-pox, chicken-pox, and vaccinia. *Med. Record*, N. Y., 1914, lxxxvi, 204.

Smoke Abatement.

KERSHAW (J. B. C.). Smoke abatement. *Science Progress*, 1914, ix, 331.

Sore Throat.

CAPPS (J. A.) and DAVIS (D. J.). The relationship of septic sore throat to infected milk. *Journ. Infect. Dis.*, 1914, xv, 130.

Street Cleaning.

WHINERY (S.). Recent progress in methods and character of street cleaning. *Amer. Journ. Pub. Health*, 1914, iv, 679.

Swimming Baths.

MANHEIMER (W. A.). Studies on the sanitation of swimming pools. *Journ. Infect. Dis.*, 1914, xi, 159.

Syphilis.

POST (A.). Syphilis in Massachusetts. *Boston M. and S. Journ.*, 1914, clxxi, 401.—SHEA (T. B.). What the City should do to control syphilis. *Boston M. and S. Journ.*, 1914, clxxi, 415.—ASSINDER (E.). Syphilis in the poorer classes: Its diagnosis by the Wassermann test and its incidence as demonstrated thereby. *Birmingham Med. Rev.*, 1914, lxxvi, 137.—McDONAGH (J. E. R.). An outline of our present knowledge of syphilis. *Proc. Brighton and Sussex Med.-Chir. Socy.*, 1913-14, p. 70.

Tetanus.

MACCONKEY (A.). Tetanus: Its prevention and treatment by means of anti-tetanic serum. *Brit. Med. Journ.*, 1914, ii, 609.

Town-Planning.

HODGETTS (C. A.). Town-planning in Canada. *Amer. Practitioner*, 1914, xlvi, 353.—PLATT (F. W.). Town-planning and industrial towns. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 436. Discussion, p. 441.

Tropical Diseases.

HEWLETT (R. T.). Review of tropical diseases. *Practitioner*, 1914, xciii, 225.

Tropics.

BREINL (A.). The influence of climate, disease, and surroundings on the white race living in the Tropics. *Journ. Trop. Med.*, 1914, xvii, 267.

Trypanosomiasis.

BRUCE (Sir D.). Classification of the African trypanosomes pathogenic to man and domestic animals. *Trans. Socy. of Trop. Med. and Hyg.*, 1914-15, viii, i. Discussion, p. 22.

Typhoid Fever.

GRIFFITH (J. P. C.). Typhoid fever in early life. *New York Med. Journ.*, 1914, c, 205.—STALLYBRASS (C. O.). Factors in the spread of typhoid fever. *Liverpool Med.-Chir. Journ.*, 1914, xxxiv, 344.—BURKART (J. L.). Brief facts concerning typhoid fever. *Public Health*, Michigan, 1914, N.S., ii, 417.—GAY (F. P.). Methods of anti-typhoid immunization. *New York Med. Journ.*, 1914, c, 825.—RUECK (G. A.). The diagnosis of typhoid fever. *Medical Record*, N. Y., 1914, lxxxvii, 671.—SAWYER (W. A.). Ninety-three persons infected by a typhoid carrier at a public dinner. *Journ. Amer. Med. Assoc.*, 1914, lxiii, 1537.

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THE SPREAD OF TYPHUS.

IN the July, 1913, issue of PUBLIC HEALTH emphasis was laid on the obscurity which still existed regarding the means of dissemination of typhus fever.

At that time substantial proof was forthcoming that head and clothing lice were essential factors in distribution of the affection. Dr. Nicole, of the Tunis Hospital, after comprehensive observation, came to the conclusion that, of the ordinary human parasites, the bed bug and the flea could be excluded as transmitters, but the head louse and the body louse, more particularly the latter, were undoubted agents of transmission. Dr. Nicole was able by the aid of body lice to convey infection from an infected ape to a healthy ape. The results of the investigations of the Hygienic Laboratory of the United States lend forcible weight to the deductions of Dr. Nicole.

More recently Dr. Kaiser, of Trieste, has published in a manual, which was reviewed in our pages in August, 1914, the result of investigations made by him into the nature of the influences at work in the spread of typhus infection amongst Turkish refugees during the Balkan wars. Dr. Kaiser is of the emphatic opinion that typhus fever infection is spread by the bed bug and occasionally by the head louse.

These conflicting opinions, taken in conjunction with the conceptions of the older school of epidemiologists, leave us with the impression that conviction as to the exact influences at work in the spread of the disease has yet to come.

During last century Russia and Britain suffered severely from typhus fever, and in the preceding century in this country jail fever, as the disease was then called, decimated prison populations in the days prior to the reform established as a result of the efforts of John Howard. Also in cities, where the poorer inhabitants herded themselves together in dilapidated and

insanitary tenements, typhus fever was one of the commoner zymotic affections. In those days the opinion of the physicians as to the epidemiology of the disease was that infection depended upon overcrowding, defective sanitation, debility, and proximity to the affected. Certainly the coincidental disappearance of typhus from prison and tenement, and the establishment of sanitary reform therein, lends considerable weight to the theories of the epidemiologists of that time.

Harvey Littlejohn observed in his investigations of typhus fever in the older dwellings of the city of Edinburgh that spread was confined to immediate contact with a patient, as there was a significant freedom from infection in those who, although living in the same tenement, did not enter the patient's room. This evidence supports the contention that the exhalations and emanations of a patient may be factors in further spread of the disease and that the striking distance is short. In times past typhus fever and typhoid fever were nursed in the same ward, and it was claimed that the only measure necessary to prevent cross-infection was to put the typhoid patient in the most airy part of the ward, i.e., near the door.

There will, no doubt, be available shortly much valuable information as a result of observations and investigations made in connection with the great Serbian outbreak. In connection with all Eastern European epidemic and endemic occurrences of the malady there is a close association with filth and general insanitary conditions. Overcrowding has proved to be very effective in the spread, for the congregation of refugees in urban centres has brought about immediately epidemic proportions of the affection. It can be reasonably asserted that the presence of body parasites, in the absence of certain other conditions, is not evidence of filth; yet where verminous infestation exists in this country, even when accompanied by evidence of other conditions which combinedly

constitute filth, there is no evidence that their presence by themselves is sufficient to produce the disease. Indeed the absence of a focus of infection may render the activities of parasites abortive as far as this infection is concerned.

It is by no means certain that our recent immunity from the disease in this country will continue. Typhus in the Near East has become pandemic. Starting from endemic centres in Galicia and Russian Poland, the disease quickly spread to Hungary, to Serbia, to the Caucasus, and to Constantinople, and disquieting reports are in circulation that outbreaks have occurred in German prison camps. The sporadic cases notified in Great Britain at the present time can have no connection with those outbreaks, but there is no assurance that wounded men from the various seats of war may not introduce the malady to this country, and the present concentration of the population under arms would provide undoubted favourable opportunity for propagation of the malady.

The present time seems opportune for efforts at a thorough investigation of the disease. The etiology until recently has been very obscure. Thoinot and Calmette, Hlava, Dubief, Balfour and Porter have described as possible causes bacteria of varying morphology, but no ultimate reliance has been placed in any of these discoveries. Recently from America comes the information that at Mount Sinai Hospital there has been isolated from the blood of 50 per cent. of a series of typhus cases a bacillus which the New York health bulletin says is in all probability the specific organism of typhus fever. If such be the case the importance of the discovery cannot be over-estimated. An opportunity presents itself for the Research Committee of this country, with the grants at their disposal from the National Insurance Fund, to offer inducement for a comprehensive investigation of the malady. It behoves those in authority to get possession of facts, not theories, which will afford protective and preventive measures should typhus visit these shores as it spreads westward in conformity with the tendency of all pandemic outbreaks.

As we go to press we read in the daily journals that the Serbian epidemic is declining. The expedition which has been sent out from this country is evidently doing useful work, and it may be that seasonal decline is contributing to the improvement noted.

THE PERSONAL FACTOR AS IT AFFECTS THE VITAL STATISTICS OF A COMMUNITY.*

By WILLIAM ROBERTSON, M.D., D.P.H.,
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IT does not require the brain of a genius, nor the special training of a sanitarian to enable one to discourse at large upon the subject before us.

The ordinary student of social problems knows that a thriftless, indolent, and irresponsible population will, sooner or later, find itself wallowing in the mire of unhygienic despond. Nevertheless the well-meaning reformer will glibly tell us how all social wrongs may be instantly righted. We have these armchair sanitary strategists everywhere. They can suggest lightning methods towards securing an Utopia, but if they had the spade instead of the pen placed in their hands they would be the first to realise how difficult was the revolution they had in view.

The first task that would probably confront them would be the repair of defective administrative organisation. Next, they would discover that the citizens had fallen asleep and required to be roused from their lethargy, in order to make them appreciate for the first time in their lives that they were born to fulfil a duty to themselves, to their fellow-beings, and the communities which give them house room.

Lastly, our candid critics would ascertain that they had quite overlooked the monetary aspect of the whole problem.

But, while dismissing the social reformer in this cavalier fashion I do not despise him, even if he be an amateur, because everyone of these earnest students of sociology is a potential factor capable of doing much missionary work in the wide domain of hygiene.

Moreover, everyone of us is improved by just criticism. Those who resent criticism and are beyond accepting advice have much need to give themselves up to serious reflection. The perfect man does not exist, and the immaculate medical officer of health has not yet been discovered.

In passing, I must not forget the so-called super-social reformers who come under the category of tub-thumpers. These ranters simply reel off reforms upon housing and other social questions. But when one comes to analyse the means suggested by them, one is forced to turn away at the impracticability of many of the suggestions advanced.

*Read at a Meeting of the Society of Medical Officers of Health on 16th April, 1915.

The land question, the wage problem, and many others come under their review, and are dismissed with a few high sounding and ear-fascinating platitudes.

Truth underlies the questions of dear land, poor wages, and so on, but the medical officer is not concerned with these so much as with the problems actually before him from day to day.

He cannot wait, for instance, until the land is cheapened or nationalised, nor can he relax his efforts at improving the lot of the afflicted people while men and masters find themselves haggling for reductions or advances of wages.

If the noisy reformer chooses to continue his well-directed and sometimes vigorous energies by all means let him do so. If he be successful in his efforts to amend Housing and other Acts, the medical officer of health will benefit in the long run, since the wheels of his administrative machinery will be moved more freely.

Leaving aside such considerations, however, let me come more directly to my theme, the personal factor.

It would be obviously absurd to attempt to trace the genealogy of the personal factor back to the days of Adam and Eve.

But when one wanders about Slumdom and surveys the denizens of this underworld one is compelled to stand stock still to gaze upon these weird folk, and ask the question—"Can it really be true that these hooligans, these wastrels, these drunkards, these thieves trace their descent from the Garden of Eden?"

The shyness of Eve has certainly gone, and we see everywhere in this back water of life true Jezebels of dirt and wickedness. Such a phantasy serves no good purpose it is true, yet it makes one marvel that such personal factors do exist in this twentieth century of ours.

That, then, is the personal factor which mainly gives the health reformer concern. It is a factor of explosive tendencies, a mine of potential mischief in every community.

You know what smallpox can do in a district infested by an undesirable factor. You may have experienced how typhus may be spread in the filthy and unventilated habitations of such people. And, within recent times, some of us have realised how heavy a toll epidemic cerebro-spinal meningitis can levy among the hapless infants belonging to the lowest grades of society. Lastly, one must not forget the steady rates which these undesirable personal factors contribute to tuberculosis mortality returns.

To change the theme for a moment, let us make an imaginary visit to a mining village, and investigate the conditions under which some people live. If you have never seen such a place, it will surprise you that white people can and do exist in such deplorable conditions as you will see on every side of you. The houses are not the worst feature. It is the environment which repels you. But my purpose is not to discuss the sanitation. It is rather to focus attention upon the personal factor which tolerates such conditions of living.

What is it that prevents the miner and his wife from demanding decency for themselves and their families? The man earns good wages, the best food is bought, though I am far from saying that it is cooked to the best advantage. The men have plenty of spare cash to keep whippet racing dogs, the public-house is well patronised, and football and horse betting may be indulged in. It is therefore not lack of money that brings about the conditions outlined.

Some coal mining companies have, at considerable cost, built sanitary dwellings for their employees. But alongside these houses you may find others that cannot be classed as satisfactory. And you will be struck with the fact that the personal factors occupying the unsatisfactory dwellings do not appear to envy their better housed neighbours one whit. They live from day to day as if such a thing as good sanitation had no attraction or interest for them.

This digression has been made to remind you that unsatisfactory personal factors are not to be looked for only in cities. This personal factor of civic life can best be likened to a blot on an otherwise clean surface. The only way one can properly deal with it is to cut it out. But if you do cut it out of the map of one part of your district you will find in a few years that the people who make up this undesirable element have begun to migrate to another part of the locality.

They vacate one warren to begin another burrow. In fact, this indolent, intemperate, and well-nigh intolerable personal factor becomes a nightmare to every health official.

What is it that is wrong with these people?

Why do they differ from other sections of the community?

Are they worse educated?

Are they past redemption?

No one can answer the first question in an off-hand way. When one comes into personal

touch with them one discovers that their chief characteristics are their unreliability, and the truth is not in them. In fact, they are the social rocks upon which the innocent and generously-disposed are often wrecked.

That is why amateur lady visitors seldom achieve success in Slumland. The lady of the slum house knows by instinct how to touch her visitor. It may be the purse or the heart. This cunning woman of the underworld of cities is always equal to the occasion. Reserves of tears she has in abundance, and lies never come amiss to her. The stories one could tell of the Ananias-like propensities of these people would in themselves provide abundant material for a treatise upon personal characteristics.

Time always appears to hang heavily upon the hands of these women. Even if they are making an attempt to scrub or clean the trail of dirt is more apparent than the streak of cleanliness.

Cooking utensils are rarely found in the houses of these unsatisfactory personal factors. A frying-pan may act as a stand-by, a small goblet making up the stock-in-trade for the preparation of meals. The randy is always open to an invitation for a taste of beer. The family milk-pitcher or a jug is sent down to the public-house, and round a greasy-topped wooden table sit our grimy-faced, bare-headed dames, bawling at one another with their raucous voices, or hoarsely laughing at some obscene jokes. It is under such parentage and amid such environment that many children come to be reared. One need not wonder that the undesirable personal factor is perpetuated.

Why do they differ from other sections of the community? This is another question which is difficult to answer. It is not, as our advanced Socialist affirms, bad environment that drives these people to drink. It appears to be bred in their bones, to be dissolute. Side by side with groups of these social bugbears you find decent people living who pay their rents regularly and keep their houses clean, genuine poverty compelling them to live in a poor district.

Our super-Socialists confidently assert that if the citizens were all provided with clean rooms and moderately rented houses, the cheery fireside of the house and the smiling faces of the women would magnetize the men folk to stay at home.

The public-house would no longer be an attraction. In process of time we may teach this bad personal factor that truth underlies

that socialistic doctrine, but it will be a slow process. We might also point out to our Socialist friends that the man is more often sinned against than the sinner.

And when the woman takes to drink the degradation becomes extreme.

Are these people less human? In many respects they are. If that were not true, they would not be where they find themselves. It is from the ranks of this personal factor that our police courts and prison cells are kept busy. And in ninety cases out of every hundred one finds that alcohol has been what I might aptly call the de-humanizing influence. The Black List was introduced some years ago to put a check upon chronic offenders, but the machine has not operated with marked benefit.

Again and again, one sees the same scarred face at the bar of the police court. Sometimes the face may be partially disguised by a black eye or a bandaged head.

"Guilty or not guilty?" the question is asked. "Guilty your honour," comes the reply, with a long pitiful appeal for leniency. The excuse advanced for mercy being that prisoner took a drop too much and was not responsible. No one can surely excuse this form of debauchery, save by suggesting that the recurring desire for drink must be due to mental deficiency.

Are they worse educated? They may have been, but in view of what we are doing to educate them, is there any excuse for the behaviour of this personal factor in and out of its house?

Health visitors systematically visit the houses in Slumland. Instructions and advice are given upon baby feeding and cleanliness. The cult of fresh air is dinned into the ears of these folks, and yet they continue to be sources of worry. Such a recital would almost convert one to the view that the task of rejuvenation was well-nigh hopeless. But experience teaches us that we need not despair.

The more we see and the more we do the more fully are we persuaded that the work of our departments is being followed by good results.

To labour among the bad personal factor is like digging a trench among shifty sand. Your excavation grows slowly, and if you relax your efforts the impression you have made is quickly obliterated, the obliteration being much more rapid than the digging.

Passing from generalities let me address myself to some of the problems that surround this personal factor. Taking them one by one I think the housing question deserves first notice.

If proof were wanted that better housing has already achieved remarkable results, one has only to refer to the improving vital statistics of this country. It is true that other hygienic measures have gone far towards reducing the incidence of disease, but the opening up of thoroughfares, the knocking down of slums, the regulation of the erection of buildings, and the standardisation of air space, form a combination, the value of which cannot be over-estimated.

But one must linger to consider this question of improved housing to ascertain its probable effect on the personal factor under discussion.

Our civic authorities have not quite grasped the importance of this side of the question.

When a housing scheme is mooted its opponents at once want to know on the one hand, why one set of the population should be housed at the expense of the other, or why a civic authority should be called upon to do what private enterprise is quite capable of putting into effect.

Taking the first question, it seems to me that the real point at issue is missed. Given a personal factor that compels the employment of a large sanitary staff, and that keeps our sanatoria and other institutions busy, it would seem almost reasonable and logical to make the attempt to arrest this steady flow by doing away with the cause.

The second question is easily answered by saying that private enterprise will not erect houses that cannot yield a fair return for the money invested. No one can complain of that attitude on the part of the investor.

Those of us who come into intimate contact with the conditions that promote ill-health have little hesitation in laying the chief blame at the door of the bad house, or the narrow street, or the sunless court. No one expects slums to be swept away in a few years, but in many centres greater activities might be expected, especially in this progressive age of public health enlightenment.

For instance, the principle practised in Liverpool might well be followed in other large centres of industry.

I allude to the housing of the dispossessed and the needy at the expense of the rates.

As I have already said, private enterprise refuses to consider the proposal to deal with the undesirable personal factor. Even the progressive municipality of Glasgow does not look with favour upon meeting the requirements of these people. In fact, it has been left to the efforts of a private company to deal with that section of the population which acts as a festering sore. This private company in Glasgow buys old properties, guts and remodels them, and provides houses suitable for the people who have been giving the Sanitary Department a good deal of trouble.

As soon as these personal factors come under the control of this private concern a firm hold is maintained over them. Rents are systematically collected, a caretaker keeps order, and any backsliding is met by immediate eviction.

But if housing reform is to make progress building bye-laws must be made more reasonable, so that the requirements of a particular class may be met.

The land question comes into the sphere of discussion, but I am not to be tempted into a controversial digression. Some years ago the Glasgow Housing Commission, after a prolonged sitting, issued the following illuminating recommendation:—

Recognising that in the improvement of the habits of the people and the elevation of the standards of comfort, as well as of morals, lies the main solution of the housing problem, the Commission recommend that a united effort be made on the part of the citizens to bring personal influence to bear upon these ends on their humbler and less fortunate fellows.

The recommendation is certainly not couched in an optimistic vein. In fact, it is tantamount to saying to the public: "Teach these people to behave better. After you have done that we may hold another Commission, and offer further suggestions."

That, to my mind, is like asking the citizens to undertake the work which a civic authority ought to perform.

You in England can deal more effectually with the unsatisfactory personal factor than we are able to do in Scotland.

This because you rightly prefer the cottage or two-storeyed habitation to the many-storeyed buildings so common in Scotland.

Nothing, to my mind, is more pernicious than the system of aggregating human beings upon limited areas. One of the strongest arguments in favour of the spreading out of houses and human beings is furnished by England, where the tuberculosis mortality rate is lower than it is in Scotland. Prejudice is

difficult to overcome, and when we overcome this Scottish prejudice in favour of high buildings, I am sure a great advance will be achieved in securing better social conditions all round.

The many-storeyed tenement with its 12, 18, or 24 houses entering off a common stair cannot by any stretch of argument be said to be a hygienic method of housing the people. If sanitary authorities have not the pluck to effect housing requirements, compulsion must be applied. Further, if poverty be the excuse advanced for inaction, reasonable loans should be granted by the Treasury.

Closely associated with bad housing comes the evil of intemperance. Nowhere do we see this more than among our slum personal factors, and that especially applies to Scotland, where whisky is preferred to beer.

There are too many public-houses planted at the very doors of the naturally dissolute. Temptation is thrown in their way, and social disaster dogs the footsteps of those who have not the moral courage to resist the gin palace. How legislation is to effect a cure of this social blight upon civic life I am not prepared to suggest. But short of veto and other legislative enactments, I have always believed strongly in the principle of opening up the interior of every public-house to the full view of the passer-by.

Why should an individual furtively look round before stealing into the public-house? And why should he feel relieved when he finds himself behind the shelter of screened windows or dimmed glass doors? Everything is done by the publican to further secrecy.

There should be as little shame felt at going in for a glass of beer as there is in entering a shop to buy milk, bread, meat, or any other commodity. If the public-house were used for the sole purpose of refreshment the arguments of prohibitionists and others would be materially modified. But as long as the alcohol vendor is permitted to pursue his present methods one cannot expect much betterment. No one who can take care of himself and can appreciate the ills associated with over-indulgence has any need to be afraid of legislation directed against insobriety. The public-house as it presently is conducted is not a necessity. It is a lethal fountain which poisons and viciates the lowest strata of society. One has only to visit a Poor-law institution to discover how large is the percentage of inmates who have been

driven to poverty and misery by excessive alcoholic indulgence.

When we can say that something has been done to discourage drunkenness we may expect to find our personal factor taking a little more interest in himself and his environment.

If Russia has been able to cut off the supply of vodka, and deprive itself of a huge source of revenue, this country could at least make some attempt to cut down its drawings from the sale of liquor.

If public-houses must exist, they might well be municipalised, and their profits set aside for improving the amenities of our cities and villages.

At present drinking is not discouraged. Municipally-owned public-houses would not exist to tempt men and women to make beasts of themselves, but could provide suitable liquid and solid refreshment for those who required such.

One has only to refer to Lord Kitchener's appeals to appreciate the power of the snare of the gin palace upon the working classes of this country. By way of illustration, let me quote from Leith. Within recent years the pay of the casual labourer at the Leith Docks has been increased by almost 30 per cent.

This type of workman is, I may say, absolutely devoid of technical training and skill. He is merely a "strag"—a man of muscle, with a fondness for whisky, and highly susceptible to strikes.

For days on end during the coldest months of winter, with the cutting east wind blowing round about them, one may see flocks of these shivering specimens loafing about the dock gates, preferring to do nothing rather than work alongside a man who is a non-unionist. A modern grain elevator was installed at the docks some years ago. The "strags" struck work because the elevator was getting too much to do.

To return to the increase of wages. When the wages were increased these labourers brought to bear "strag" philosophy. It was to this effect. Formerly they had to work five or six days a week to earn 23s. Now they can earn over 30s.

Finding, however, that 23s. is enough for their purpose, they now prefer to work four days a week and go idle the other two. And that is what is regularly done. The seven additional shillings were not apparently wanted to enable them to provide better houses, more wholesome food, and greater personal comfort.

The striker gained the day, but no more work was done than before.

One of the largest firms in Leith employed 800 men as dock labourers. Careful investigation brought out the information that out of that number only two removed to more commodious quarters as the result of the 30 per cent. increase of pay.

When one is compelled to work amongst such an unthinking and unreasonable personal factor one's efforts for social betterment are not made simple. The children of these men get free meals. Free boots are given out in winter, soup kitchens are provided and charity is lavished upon them. Yet, the public-house continues to flourish.

If this country has been a wonderful one, how extraordinarily prosperous might it not have been if the liquor traffic had been adequately controlled.

Turning away from that unsavoury subject, I feel sure our education authorities could take fuller advantage of the present situation.

Apart altogether from the teaching of temperance, cookery lessons ought to be given in every school, the cooking being made specially applicable to the personal factor involved.

Indeed, I would go further and say that every girl should, if necessary, be required to pass an examination in simple dietetics. The Sanatorium at Leith has brought this necessity very prominently before me. Our patients are chiefly drawn from the artisan population. If we set before them a diet of meat and potatoes, they are satisfied. Ham and eggs with potfuls of black over-infused tea, they will consume with relish. But if we request them to eat rice, beans, macaroni, peas, lentils or made-up dishes, they prefer to starve. Milk puddings are seldom prepared in their house, and they frankly tell you they have no time to make soup. The housewife prepares one meal a day for the husband when he returns from work. That meal is often hastily got ready, and as often as not tinned foods are requisitioned. The school children are fed on tea, bread and butter with jam or sugar. Porridge is used by the better classes. One seldom sees that article of diet in the home of the ordinary artisan.

Surely, then, it is the duty of school authorities to see to it that a corrective to this state of matters is applied.

Last winter I organised cookery lessons in the heart of the slums. The attendances were

good, but the people who appeared only came because they expected to receive free meals. They made no attempt whatever to profit by the teaching. A blackboard was installed and on it the articles to be used were inscribed. Opposite the ingredients of each dish were marked their prices, and finally the food values were commented on in such a way that the most ignorant could understand what was being said.

When the demonstrations were at an end the houses of those who attended were visited by lady members of the staff. In no single instance was any recipe imitated or tried. An illuminating fact was brought out by this experience. We found that the differentiation between classes was not, as is popularly supposed, confined to the upper circles of society. Plebeian snobbery is as apparent amongst these people as in other grades of life.

The very poor and thriftless attended our cookery lessons, but those who believed they were a step higher up the social ladder refused to mingle with the riff raff. This fact brings our personal factor into very bold relief. As I have tried to show, it is a type by itself. It is dreaded by a public health department, and spurned by a kith and kin very little removed from it, from the social standpoint, but apparently separated by a line of dirt and dissolution.

The point that appealed to me was that these women who came with their unclean faces, shawl-covered heads and alcoholic breaths were beyond the learning age.

It is the girls at school we must try to reach. In fact, it is only by teaching this class at the right time and in the right place that a gradual rejuvenation can be expected to take place.

If public health administration were bound by the broad bands of red tape that appear to encompass codes of education, I could well imagine a chaotic state of sanitation in this country.

One is almost afraid to quote Germany at this time of day, but from our neighbours we might borrow many lessons in the art of bringing up a useful generation of womanhood. The most domesticated women in this world are to be found in Germany.

I need not labour these points any further. I have said enough to give you cause for reflection upon the present day situation.

Notwithstanding all I have said there is every reason to be satisfied, but if we can

speed up the process of reform, by attacking the cause of all the mischief, we shall feel that we have not worked in vain.

DISCUSSION.

THE PRESIDENT said that Dr. Robertson had dealt with his subject in a fascinating and charming manner. It was rarely they heard in that room from a Scotsman that anything in Scotland could be worse than in England, for they had constantly been told that Englishmen had much to learn from the Scotsmen. He doubted whether Dr. Robertson would have dared to read his paper before the Scottish Branch of the Society, and a considerable amount of courage was displayed in placing his facts before the Society.

DR. VEITCH CLARK (Croydon County Borough) said that the paper had been conceived in the most interesting manner, and that amongst many issues in public health the two brought most prominently before them had been drink and housing.

He himself thought that the sale of alcohol as a beverage should be effected under very definite restrictions. So far as housing was concerned he did not think that flats as a specific form of housing should be altogether condemned. Before he came to the south of England he had had experience in the north of clearing out slums and erecting flats in partial substitution. These latter were extremely well kept. He had been specially interested in comparing the conditions which existed in Leeds with those in Croydon. In Leeds one found the typical close, confined slums of the industrial city; in Croydon the houses were practically without exception cottages with small gardens attached to them. The actual condition of the houses in the poorer parts of Croydon was not one whit better than that of those in the Leeds slums; the houses were as dirty and the people were as slatternly and as much addicted to alcohol in the one place as in the other. There was not the slightest attempt at personal cleanliness and the people were not in the least to be placed on a higher plane in the social world. Whether in the crowded slum or in the cottage with space for garden the same type of person exhibited exactly the same characteristics.

He himself thought that the direction in which medical officers of health must in these days largely turn their attention was the improvement of the individual. It did not really matter about the present generation: our efforts must be governed by a long view towards producing a better posterity—if the individual were improved the general status and well-being of the population would be improved. Dr. Robertson described as one of the principal causes of the

higher mortality from tuberculosis in Scotland the type of housing in that country. There is no doubt that bad housing was one of the important causes of a high tuberculosis death-rate, but in this particular instance the speaker considered that insufficient attention had been directed to the emigration of a very large proportion of the population of Scotland to other countries, especially as those emigrants to England or to more distant parts were generally of a virile and healthy type. If those people had remained in Scotland the death-rate from tuberculosis would have been considerably lowered. The present statistics in that respect did not, in the speaker's opinion, indicate the true national tuberculosis mortality.

DR. H. R. KENWOOD (Stoke Newington Metropolitan Borough) said that the paper was an excellent one, and that Dr. Robertson had expressed sound views, which appealed to those who had experience of such social matters as he had referred to. The ultimate solution of most social evils must surely be held to rest with the education authorities. Compared with an educational system which aims very particularly at training all children for good citizenship, most other remedial measures appeared to him as but little more than tinkering.

DR. CALDWELL SMITH (Wandsworth Metropolitan Board) said that as a fellow Scot there were one or two outstanding points in the paper to which he wished to refer. The first was whiskey, which no doubt was the question of Scotland.

It was painful to a Scotsman who had resided for the most of his life in the south to see Glasgow on a Saturday night. The number of drunken people in the large railway stations was perfectly horrible for an Englishman to witness, and yet nobody was taken up by the police. Whether the total abolition of whiskey was a remedy for that state of affairs he was not prepared to say; but unquestionably the prohibition of the sale of bad whiskey would do a great deal of good. His son had been on board a destroyer which met with an accident in the North Sea, and it was compelled to go round to the West Coast. During the voyage the ship met with another accident and put into the nearest Scottish port. The men had not been on shore for six weeks, and as soon as shore leave was given the men made a bee-line for the nearest public houses. When they came back to the ship most of them were half-seas over, and exceedingly ill; they had been drinking, in some of the low public houses of the town, the whiskey commonly known in the West of Scotland as "speil the wall," or "kill the carter." He thought that legislation should prevent the sale

of whiskey under six years old; that would do a great deal to prevent or diminish drunkenness. As one who had passed through his apprenticeship in Scotland in mining and steel works districts, he thought that the housing question had been settled by the provision of better dwellings. He was sorry to hear that that was not the case. The mortality in the old-fashioned miners' houses was excessive: due largely not to the house itself, but to the sanitary arrangements provided. The same held good in regard to flats. He did not think flats *per se* were unhealthy. The London County Council had erected an enormous number of dwelling-houses on the flat system, and the mortality there was not greater than in cottage property. They had got to go back and face what Dr. Robertson called the personal factor. The fault lay in the individual. If some of these people were put into palaces these would soon be converted into pig-styes. He himself would not condemn *in toto* well-built flats on the Scottish system. With the enormous amount of money that had to be paid now for land in towns on which to build houses, the flat system was the only solution of the housing question.

DR. CHARLES PORTER (St. Marylebone) said that he was agreeably surprised to find that Dr. Robertson's paper did not deal, as the title suggested, with complicated figures, but with the individual and the modern side of public health work. The portion of the paper dealing with alcohol interested him greatly, and he declared himself in favour of the present opportunity being taken to prohibit it. Greatly to his surprise he had been fired at by some medical officers of health for suggesting stoppage of alcohol, though he would have thought it impossible to find a public health man who was otherwise than in favour of adopting such a course. The fact that even if alcohol were stopped certain people would still manage to get drunk, seemed to him to count for very little. He was thinking of the future generation, who would have a chance of coming into a world where public-houses were few or absent. The improvement that would result would be remarkable, and the personal factor which gave Dr. Robertson and other medical officers so much trouble now would be much more easily dealt with. He did not agree with the reader of the paper that the flat was necessarily a bad form of housing. Bad as some of the flats in Leith might be, he felt sure they were nothing like so bad as some of the comparatively modern flats and many of the tenement houses in London.

DR. W. A. BOND (Holborn Metropolitan Board) said that the paper had been most instructive, racy and amusing. He quite agreed with Dr.

Robertson that all girls ought to be taught at school how to cook, and how to look after their household when they get married. In Holborn they had a large number of good block dwellings in which the death-rate was low, but other things being equal, he would rather have cottages with a garden than block dwellings, but more depended upon the personal element, and it was very difficult how best to deal with the lowest types of the population. They should try to limit as far as possible the temptations to drink, and the hours of opening and closing should be rearranged, while the specific gravity of beer should be reduced. As medical officers of health they knew the enormous amount of damage done by drink. He had been a teetotaler for a fortnight, but he did not know whether it would do any good (as an example). He had always been a moderate drinker, and he did not think he was any the worse for abstaining. A great deal of good would be effected if drink were limited. In Holborn since the appointment of a lady visitor the infantile death-rate had been reduced very much during the last ten years.

DR. A. MEARNES FRASER (Portsmouth) complimented Dr. Robertson on his very instructive paper and the delightful style in which he had presented his facts. There were three points on which he would like to dwell very briefly. He quite agreed with Dr. Robertson that a self-contained house or cottage was preferable and more home-like than a flat or tenement, and would like to emphasize the value of a small garden which, if the tenant took an interest in it, was a powerful counter-attractive to the public house. He would like, in connection with the remarks on cookery lessons, to instance the experience of a lady who in the south of England gave cookery lectures to the working classes. Her practise had been to get the housewives to bring their own food to the lectures and she had then cooked this before them in such a way as to produce wholesome and appetising dishes. By this means of procedure the interest and attendance of those whom it was desired to attract was secured more successfully than by any other method. Lastly, he (Dr. Fraser) could not quite agree with Dr. Robertson that drunkenness was the one great cause of insanitary houses. He thought there was a tendency, in considering the drink question, for people to jump to conclusions and to attribute all sorts of evils to drink, which careful investigation would not justify. As a corrective to the exaggerated ideas that are held by some on the influence of alcohol he would suggest the perusal of a very interesting address by Dr. C. A. Mercier, entitled "Alcoholism," published in the *Lancet* (November 30th, 1912).

THE PRESIDENT said the merits of the discussion, as well as of the paper, were the interesting truths revealed. The housing question was certainly not responsible for all the public health troubles. It was quite true that they might get statistics relating to flats, and compare them with those relating to cottages, or compare back-to-back with through houses, but fallacies must be guarded against. Equal care must be taken when comparing temperate with intemperate communities; the great factor was the personal equation. They were all agreed that even if there was not entire prohibition of the sale of alcohol, it would still be a very good thing, as Dr. Caldwell Smith had pointed out, if there was a prohibition of the sale of bad alcohol. In England, where not so much whisky was drunk as in Scotland, there might be sold a very light beer, such as the small beer they had at school years and years ago. That did not give a headache in the morning, though perhaps it was for that reason some working men did not like it. The solution of the question, he thought, was not total prohibition, but the sale of a very light beer and innocuous whiskey.

DR. ROBERTSON, in a brief reply, said he was very pleased to observe that in this discussion they had met on common ground, and were in agreement on most points. As to the housing question, he reminded the meeting that he had specially instanced tenements of flats where as many as twenty-four families entered off a common stair, which was very often ill-ventilated, dark, and by no means ideal. He did not think that was a good method of constructing houses for the working classes. When tenements of flats entering from balconies were suggested in his district, the objection that the houses would be cold was strongly advised. The necessity for providing larger rooms was claimant, and this was brought out by the preponderating mortality from pulmonary diseases, especially in one- and two-roomed houses. During the last outbreak of cerebro-spinal meningitis in Leith the death-rate among children in the smaller houses was as high as 70 per cent. of the total deaths. In thanking the members of the Society for the manner in which they had received his paper, he thought he had, at any rate, disproved the fallacy that the Scots were unable to see a joke without the aid of a surgical operation.

THE BALKAN CAMPAIGN.—Officers in the R.A.M.C. will read with interest and profit a recently published work on "La Guerre en Bulgarie et en Turquie" by Dr. Octave Laurent. Dr. Laurent was Professor of Surgery at the University of Liège, and his book deals with eleven months' campaign in the Balkans from the point of view of the surgeon and of the sanitarian. It contains upwards of 300 photographic reproductions, many being skiagrams illustrative of operations, and is of a handy size for the pocket. It is published at the price of 6 fcs., by A. Maloine, 25-27 rue de l'Ecole de Medecine, Paris.

ARE DEFINITE STANDARDS POSSIBLE IN THE PRODUCTION AND SALE OF MILK?*

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IT may appear inopportune to discuss the question of clean milk while the whole country is deeply concerned with the thrilling and impressive subject of war, but the opinion prevails that public health work should be continued as far as possible under the unusual circumstances. Moreover, a discussion on the subject of this paper, which was postponed last October, may not be deemed entirely out of place when it is considered that the Milk and Dairies Act of 1914 comes into force in October of this year.

The discussion will be assisted considerably by the fact that we have before us the terms of the new Act which is to govern not only by the terms of its sections, but chiefly by orders made under Section 2, the steps to be taken to secure a wholesome and pure milk supply. For years the subject of a pure milk supply has been to the forefront of public health conferences and discussions, and for years an Act to deal with it has been urged and demanded, and now at last we have within our grasp the means by which, if they be judiciously used, our milk supply can be effectively supervised and improved. The policy of the milk trade is conservative, and its opposition now having been considerably broken down, the Act should prove of value to the trade on the one hand by bringing about an improvement in its methods, and on the other hand to the public by giving some measure of protection. Milk producers and retailers are not only inclined to resent any suggested attempt at improvement as meddlesome interference, but they are assisted in this attitude by the apathy of the public. The milk dealers are perhaps mainly influenced by their desire for monetary gain, but at the same time largely also by ignorance of proper methods. Our policy must not be aggressive, but should be educational as well as supervisory, and in taking the Act into consideration and in enforcing the orders and, if necessary, standards made by them, we must guard against harassing the trade and unduly raising the price of milk. A rise in the price must especially be considered in relation to the poorer or working classes. A pure and clean milk is required for all classes, although

* Paper read before the Midland Branch, March 4th, 1915.

the Act, some would say unfortunately, has made provision for authorising the sale of "certified milk." It may be contended that what is provided for the rich should be provided for the poor in the same way as a pure meat supply; but I am hopeful that the authorisation of certified milk will stimulate farmers to a healthy competition which will result in much improved methods of handling milk, and in efforts on their part to rear healthy and suitable dairy stock.

In view of the distinction in the Act between milk, or, as we had better call it, ordinary milk, and certified milk, the subject will be more suitably discussed in two parts: firstly, as regards ordinary milk; and, secondly, certified milk.

ORDINARY MILK.

With regard to ordinary milk the question, Are definite standards possible in the production and sale of milk? can be considered from two points of view: (1) bacterial and (2) general standards.

BACTERIAL STANDARDS.

Relative to bacterial standards it may now be stated that it is not proposed to consider pasteurisation. Pasteurisation has lost its popularity in this country, if it ever had a strong hold on the public. Our object is to secure a general milk supply of high bacterial purity, free from the tubercle bacillus, and protected from exposure to infection from such diseases as enteric fever, diphtheria, and scarlet fever; it is our policy to prevent contamination, and not to destroy the deleterious matter after its admission. It is unnecessary to discuss the effects of pasteurisation, whether its efficiency can be guaranteed without affecting the natural character of the milk, its antiscorbutic properties, etc., or whether the destruction of the enzymes naturally present in the milk has any influence on its nutritive value. The last subject is fully considered in Dr. Lane-Clayton's reports to the Local Government Board, to which those who wish to consider the matter more deeply may be referred.

For convenience, the subject of bacterial standards may be divided into six heads:—1, General or total bacteria; 2, bacillus tuberculosis; 3, other special bacteria; 4, sediment; 5, leucocytes; and, 6, cooling.

1. *General or Total Bacteria.*—As regards the total bacteria, it may be asserted that the greatest bacterial contamination—and by that is meant quantity and not quality—occurs at

the cowshed where the milk is produced, an assertion supported by experimental evidence. I think I may fairly claim to have proved this in my experiments carried out for the Yorkshire Joint Committee on Milk Contamination.

Milk directly drawn from the udder is not sterile, but contains a varying number of bacteria, the number being greatest in the fore-milk and lowest in the strippings. Moore found 7,200 and 8,400 bacteria per c.c. in the first milk, and 546 and 504 in the last milk; while Schultz found 97,000 in the fore-milk and 500 in the strippings. Harrison obtained results varying from 18,100 to 54,800 in the fore-milk and 890 to 4,820 in the milk drawn after the fore-milk. In my own experiments, eight cows being under observation, the milk from separate teats gave counts of from 33 to 6,000 bacteria per c.c. in the fore-milk; 1 to 3,548 per c.c. in mid-milk; and 3 to 2,970 bacteria per c.c. in the strippings. The high bacterial count in the fore-milk leads one to advise that the first few cubic centimetres drawn should be discarded.

While one quarter of the udder may give a high count, another may give a low one. In the experiments quoted the lowest average for fore-milk from all quarters of a single cow was 49, and the highest 3,905 per c.c. The average of the whole milk from all quarters would probably be under 1,000 per c.c.

Although the bacterial content of the milk taken direct from the cow may be less than 1,000 per c.c., that delivered to the consumer is very different. Milk obtained in London was found by Pakes to have 3,000,000 to 4,000,000 bacteria per c.c., by Eyre 3,000,000 to 30,000,000 per c.c., and by Swithinbank and Newman 340,000 to 4,800,000 per c.c. Milk supplied to the large Yorkshire towns was found to contain from 11,750 to 3,200,000 bacteria per c.c.

Various factors have to be considered as affecting the increase in the number of bacteria in milk from the time it leaves the udder until it reaches the consumer. First of all, we have to deal with the methods of handling the milk at the cowshed, next during transit; and, lastly, at the retailer's premises or cart. At the cowshed, as has already been stated, the milk receives the greatest measure of its bacterial contamination; but before it reaches the consumer it passes through many vicissitudes and hazards, each leaving an indelible mark on its quality before it reaches the consumer.

At the cowshed pollution is derived from the udder of the cow, from the clothing and hands of the milker—especially in wet milking—from the air of the cowshed, and from the milking-pails and milk churns.

The contamination from a dirty udder may be enormous. Frequently one has seen cows being milked with their udders and haunches plastered with dry dung, which is easily dislodged, and precipitated into the milk pail. When one considers the number of bacteria present in the dung, as many as 7,000,000,000 per gram, a general idea of the extent of the pollution of the milk can be imagined. Furthermore, the tubercle bacillus, as shown by Rabinowitsch, by Shroeder and Mohler, and by the Royal Commission on Tuberculosis, may gain entrance to milk through cow-dung.

Culture plates held underneath a dirty udder during milking show strikingly the extent of the pollution. By grooming the cow, and still more by washing the udders, and leaving them moist, a considerable improvement can be obtained. For example, the milk from five cows whose udders were brushed and washed gave an average of 472 bacteria per c.c., while that from two cows whose udders were left dirty contained 11,250 per c.c. If the udders are brushed only, and especially if just before milking, the bacterial content of the milk is actually much increased. Simple brushing seems to disturb the bacteria and dirt adherent to the udder. It is essential in washing that the udder be not dried, but left moist.

These results confirmed those of Russel, who got 330 bacteria per c.c. from cows which had the udders cleansed and washed, and 15,500 per c.c. from the cows in the remainder of the herd. Lauder and Cunningham in this country have recently shown the good results arising from washing the udders and leaving them moist.

A still greater improvement can be obtained by using a milking-pail with an opening of such a size as to permit easy milking, but sufficiently small to exclude much of the dirt and bacteria falling from the udder. The opening may be reduced to one-third or a quarter of the usual size, thus excluding to that extent bacteria and dirt which is admitted by the ordinary pail. Stocking has shown that 63 per cent. of the dirt may be excluded by the use of a suitable pail. Why a suitable milking-pail has not so far been generally adopted by milk producers seems incomprehensible. It can only be put down

to their want of knowledge and conservatism; conservatism, however, is usually due to want of knowledge and perception.

Large numbers of bacteria, derived chiefly from the disturbance of the bedding and the handling of fodder, are to be found in the air of the cowshed. The remedy is to refrain from feeding the cows or disturbing hay or straw just before milking-time and to take the milk out of the cowshed immediately after it is drawn.

Improperly cleansed milking-pails and churns are a serious source of contamination of the milk, and one to which farmers and those handling milk should devote special attention. Often the method adopted to "scald" these receptacles consists in pouring some hot water (it is not always boiling) into one can from which it is poured into others successively, the first can being perhaps the only one which is sufficiently cleansed or sterilised. This practice may be due to want of knowledge or, perhaps in most cases, to lack of sufficient means of securing boiling water to deal with all the cans to be cleansed. It is my opinion that uncleanly cans are one of the most important sources of pollution of milk, and a source which requires particular attention on the part of all persons handling milk. Everyone dealing with milk, whether as a producer or retailer, should have at his disposal the means of securing an ample supply of boiling water, and a proper place for storing the cans after cleansing. Milk pails, after cleansing and when put away before being used, should always be kept upside down so as to prevent their being contaminated by bacteria and dust falling into them. For the same reason milk should be kept in every instance in a proper milk store, and should be covered, even though the store be a specially constructed one.

Milk coolers offer a large surface for the contamination of the milk, but if the cooling is carried out in a proper dairy where the air is pure, the number of organisms gaining admission is small and may be neglected. It is in cases where cooling is carried out in the dirty cowshed, or in a dusty place, such as an annex where fodder is kept, that serious pollution has to be considered.

One other source of contamination which may be touched upon is the milking machine. Samples of milk drawn by milking machines, so far as I have been able to secure them, have given disappointing results. The bad results are due to the intricacy of the various parts of

the machine and the resulting difficulty of cleansing, the sucking in of the bacteria-laden air of the cowshed, and often, in spite of what manufacturers may say, the cups dropping off the teats on to the floor of the cowshed, the dust from which is sucked into the milk.

Several new machines have recently come into the market and perhaps they may show an improvement, but one is inclined to be sceptical as to results until they have been conclusively proved to be satisfactory when tested in the ordinary cowshed and under ordinary conditions.

Having now considered the general pollution at the cowshed, let us follow the milk on its journey to the consumer. The first risk the milk runs is due to the defective construction of the railway churn, which, as often made, has an imperfect lid or cover which exposes the lip, over which the milk is poured, to contamination by those handling the churn. Holes in the lids, which cannot be justified by any scientific reasoning, but which are adopted just because the farmers say the milk keeps better when the churn is ventilated, furnish another means of entrance of dust and bacteria. A rational type of churn with the lid covering the lip completely, and without holes, should be adopted generally. Above all, the lids of churns in transit should be locked or sealed to prevent interference with the contents. Rarely does one find special railway vans reserved for milk traffic, and so far as I am aware there is not in this country a single refrigerator van used for carrying milk. In the type of van or carriage in general use the milk is liable, if the lids of the cans are defective, to contamination from dust and improper handling, or to tainting by bad odours. Proper storage places are practically non-existent at the stations. The trade and the public health service should insist on suitable clean vans and suitable storage places being provided for milk traffic. It is an important traffic—from the financial aspect so far as the railway companies are concerned, and from a public health point of view as regards the consumer—so that it deserves special consideration. The provision of suitable refrigerator vans would certainly assist in providing a wholesome milk for the public. Greater co-operation between the farmers so as to secure regularity in the method and time of delivery of the cans to the railway companies would be of great assistance, and would tend to encourage the

companies to offer better facilities and cheaper rates.

In the retailer's premises or cart pollution of the milk results from careless handling, the use of unclean milk vessels, keeping in unsuitable places, and exposure to the air and to dust and flies.

Having now enumerated the principal modes of pollution of milk between the cow and the consumer, there is yet to be considered the most important factor which influences the ultimate bacterial content of the milk. This is the effect of temperature, the action of which is in direct proportion to time—in other words, the duration of transit from the farm to the household.

The effects of temperature can be shown by reference to the experimental results of keeping two samples of milk, one at 18° C. and the other at 5° C. The first contained initially 303,000 bacteria per c.c., and after keeping for 16 hours at 18° C., 4,120,000 per c.c. were found; the second contained, when first sampled, 43,000 per c.c., but after keeping for 17½ hours at 5° C. the number of bacteria present was found to be practically the same—namely, 41,000 per c.c. Conn demonstrated in several experiments that when milk was kept at 10° C. the number of organisms at the end of twelve hours had not increased—in fact, a slight reduction had taken place in all samples.

Other observers—for example, Freudenreich, Conn and Esten, and Park—have also shown the marked effect of temperature and time. But apart from experiment, the marked effects of temperature are well recognised in practice, milk in winter keeping better than in summer.

It might be pointed out here that the higher the temperature the more readily do the glucose-fermenting or coliform bacteria multiply. The members of this group readily cause souring and curdling of the milk, and are most undesirable organisms. Delépine has demonstrated the influence of temperature and time in increasing the toxicity of milk when inoculated into guinea-pigs, and the importance of cooling the milk.

Now, having dealt with the various factors governing the general bacterial content of milk, we may consider to what extent improvements can result if sufficient attention be paid to them. At the cowshed, especially, one can find considerable improvement by attention to details, and my observations at Garforth clearly show this.

At first, in the beginning of June, when the cows under observation at Garforth were kept

outside, the bacterial content of the milk was found to be 106,000 per c.c. Then attention was directed to the milk pails and cans, which were steamed and cleaned efficiently: the result was that at the end of June the bacterial content was reduced to 61,000 per c.c. Afterwards, in the middle of July, attention was called to the udders of the cows, which were then dry-brushed, and to the hands of the milkers, with the result that the number was further reduced to 13,800 per c.c.; but in November, when the cows were indoors, the number rose to 18,000. After washing the udders of the cows, while still indoors, the bacterial content of the whole supply fell to 3,460 per c.c.

This milk was secured by the ordinary cowmen, who had exercised reasonable care and adopted cleanly methods, in quite an ordinary cowshed with no frills or embellishments.

The bacterial content of the milk at the farm can thus be an indicator of the care and cleanliness exercised in its production. Russel states that the mixed milk of a herd that is kept with any reasonable degree of cleanliness, if examined immediately after it is milked, usually will not contain more than 5,000 to 20,000 germs per c.c. Grotenfeld says that milk from cows well cared for and carefully milked will, as a rule, contain hardly more than 1,000 to 6,000 per c.c. Perhaps 1,000 per c.c. is rather a low number, but the experiments already recorded show that milk containing less than 5,000 per c.c. can be readily obtained with the exercise of reasonable care and cleanliness. Schweinitz kept under supervision a dairy which supplied what was called "sanitary" milk. With respect to 135 samples of this milk which were observed the number of bacteria per c.c. varied in the majority of cases between 200 to 5,000 per c.c. Three samples showed over 50,000 per c.c.; three others over 20,000 and less than 50,000 per c.c.; one over 15,000 and less than 20,000 per c.c.; two others over 10,000 and less than 15,000 per c.c.; two others 5,000 and less than 10,000 per c.c.

On April 21st, 1904, the Boston Board of Health forbade the entrance into the city of milk containing more than 500,000 bacteria per c.c., and having a temperature higher than 50° F. During June, July, August, and September following the regulation 2,394 samples were taken and tested, and no fewer than 42.5 per cent. were found to contain less than 10,000 bacteria per c.c.

In my observations of milk as it leaves the cowshed, 73 samples were taken, these being divided into four groups according to bacterial content: Group A, with content under 15,000 per c.c., included eight samples, or 11 per cent.; Group B, with content between 15,000 and 50,000 per c.c., 34 samples, or 47 per cent.; Group C, with content of between 50,000 and 100,000, 15 samples, or 20 per cent.; and Group D, over 100,000, 16 samples, or 22 per cent. This grouping shows the great variation in the bacterial content of milk as produced at the farm, but it also shows that under ordinary circumstances, none of the places under observation being what may be called model cowsheds, milk with a bacterial content under 50,000 per c.c. can be readily obtained.

As a result of my own observations, and taking into consideration those of others, I suggested in 1908 a standard of 50,000 bacteria per c.c. for milk as it leaves the cowshed. This standard would have been satisfactorily passed by 42 out of the 73 separate milk supplies which came under notice.

Were milk produced at the farm of a little less than this bacterial content, were it cooled there to 10° C., placed in properly sealed churns with good lids, transmitted in suitable railway vans, and handled with care by the retailer, a supply would be readily provided for the consumer containing little over 50,000 bacteria per c.c.

So long, however, as cooling is insufficient and railway vans are unsatisfactory the consumer must tolerate a milk of much higher bacterial content. One must recognise the great difficulties involved in securing a satisfactory product when the long distances some of the milk travels before it reaches the consumer are considered. In my observations in Yorkshire I found that milk even travelled so far as 270 miles before reaching Hull, and 100 miles before reaching Sheffield. London obtains milk from as far away as 420 miles, the average distance being about 200 miles. Herein lies a great difficulty in laying down any definite standard for milk as sold by the retailer.

In establishing the standards it is necessary to take into consideration the time that has elapsed since milking and the distance travelled. A town which receives its milk from the surrounding neighbourhood should have a much lower standard than a large city which receives its milk from farms hundreds of miles

away. Thus it is impossible to make any definite standard for the whole country.

Arbitrary standards might be made for towns, and especially for large cities, such standards not to be used as ground for legal action, but simply as a guide in drawing attention to farms which are improperly managed or where there is an absence of that conscientious care which is so necessary in milk production. In the case of large towns and cities milk which contains over 500,000 bacteria per c.c. should lead to the inspection of the source, and for small urban districts, near which the milk is produced, the standard might be 50,000 or 100,000 per c.c.

In the United States, where a great amount of attention has been given to the production of pure milk, and where a large amount of original work and literature has been produced on this subject, standards have been laid down in a great many cities and towns. For ordinary raw milk the standards vary from 50,000 bacteria per c.c. to 1,000,000 per c.c., 500,000 per c.c. being mostly commonly adopted. But, as regards the American standards, it has to be recognised that although they may be laid down in regulations they are used simply as guides and are not rigidly enforced, their impracticability having become apparent to the health authorities.

Eastwood, who carried out an enquiry regarding these standards on the spot, says:—"Some of these bacterial standards look excellent, on paper; but are they really enforced? My experience in America leads me to believe that they are not; and in several instances I found that the efforts which had first been made to enforce them had failed, and that further attempts to prosecute dealers or revoke their licences, on the ground that they had exceeded the limit imposed by the bacterial standard, had been abandoned. This was almost to be expected, owing to the obvious difficulties of enforcing the standard."

These standards, however, have served a useful purpose, and although their enforcement has been found to be impracticable, good results have been secured. As Rosenau says:—"The bacteriological examination of milk gives us a clue to the cleanliness of the methods employed, the temperature, and the age of the milk. The health officer who has the advantage of bacteriological assistance knows that the milk of dairies containing numbers of bacteria is dirty, old, or warm. With a bacteriological count as a guide it is

comparatively easy to determine the cause of the trouble and to institute proper means to correct it. The enumeration of bacteria in milk is, therefore, one of the readiest and cheapest methods at the disposal of health officers to determine the general sanitary quality of the market milk supply. The laboratory results serve not only as a guide to direct the efforts of the health officer, but confirm the conclusions arrived at from the inspection of the dairies and dairy farms."

With Rosenau I am in entire agreement. Let us refrain from laying down any general standard of bacterial content, but let each medical officer of health adopt an arbitrary number as a guide in directing his attention to farms which are indicated by the results.

The Milk and Dairies Act, it appears, scarcely contemplates a bacterial standard, for in Section 5, Sub-section (2) it states:—"The result of an analysis or bacterial or other examination of a sample of milk taken under this Act, shall not be admissible as evidence in proceedings under this Act, or in proceedings under the Sale of Food and Drugs Acts, 1875 to 1907, unless the provision of the last-mentioned Acts, which relate to the division of samples into parts, are complied with," etc. Now, the division of samples into three implies that the remaining two samples can be analysed later and the analysis given as evidence. But, in the case of milk, an almost immediate analysis is demanded for the estimation of the bacterial content, and if the other parts be kept for any length of time, even though kept in ice, their analytical results would show a considerable difference from that of the first part.

It is essential in the interests of justice that the vendor should possess the means of verifying the analysis by having his sample now dealt with, but, as already stated, unless submitted to analysis almost immediately the results would be worthless. Herein lies an almost insuperable difficulty in enforcing a definite general standard, and conclusive argument, to my mind, against its adoption.

2. *Bacillus Tuberculosis*.—There can be no two opinions as to what definite standard as regards bacillus tuberculosis can be applied to milk. It has been understood that the presence of the tubercle bacillus, no matter in what numbers, renders the milk unfit for human food. The Milk and Dairies Act, 1914, Section 1, prohibits the sale of tuberculous milk or the use of it for the manufacture of products for human consumption. Power is

given by Section 3 to stop the supply of milk likely to cause tuberculosis. Large powers are given in Sections 4 and 5 for the sampling of milk, and also for compelling the inspection of dairies from which milk is obtained, if the medical officer of health of the area receiving the milk has reason to suspect that tuberculosis is caused, or likely to be caused, by its consumption.

Under Section 7 a local authority may, and where required by the Local Government Board shall, appoint one or more veterinary surgeons, and may, and when required by the Local Government Board shall, provide or arrange for the bacteriological and other examinations of milk. One hopes that the Local Government Board will make it compulsory for all local authorities, or at least the councils of counties and of county boroughs, to carry out these duties.

With satisfactory provision for bacteriological examination of milk samples and with systematic veterinary inspection of the cows, added to the powers under the Tuberculosis Order, 1914, a scheme for dealing with the whole question of tuberculosis in milch cows on the lines of those laid down by Ostertag would be in force in the country. This would constitute a great step of progress. Moreover, if local authorities would follow the lead of Birmingham in offering farmers a free supply of tuberculin and veterinary assistance along the lines suggested by the Royal Commission on Tuberculosis, the more thorough method of dealing with tuberculosis in cattle, which is associated with the name of Bang, would be encouraged amongst milk producers.

In this paper there is no occasion to enter into the prevalence of tuberculous milk except to state that the percentage of milk supplies found to be tuberculous varies in different areas, and perhaps averages about 10 per cent. over the whole country, but one may point to the satisfactory results which have occurred from efficient supervision in some of our large cities, notably Manchester.

3. *Other Special Bacteria.*—Under this heading may be considered the glucose-fermenting bacteria, streptococci, and bacillus enteritidis sporogenes.

Glucose-fermenting bacteria, often called coliform organisms, are usually present in ordinary milk, both as sampled at the cowshed and as retailed to the consumer. Harrison, MacConkey and myself have failed to get glucose-fermenting bacteria in milk drawn

directly from the udder. Further, these organisms have been found to be absent from the air and dust of the cowshed. Their source can be definitely stated to be dried dung from the flanks, udder and legs of the cow, and improperly cleansed milking pails and milk cans. Old excrement got from the haunches of a cow was found on examination to contain a much larger number of glucose-fermenting bacteria than fresh excrement obtained from the floor of the cowshed. It is this old dung and not that recently passed which enters the milk.

Milk churns improperly cleansed, but made ready by the farmer to receive milk, were found to contain a large number of glucose-fermenting bacteria when washed out with sterile water. Probably these organisms found in the cans originally came from dung, thereafter being propagated in the milk when kept at a temperature favourable for growth, and becoming, on account of imperfect cleansing of the cans, a serious source of pollution of the fresh milk. Similar remarks may be made with regard to the source of streptococci, both as regards dung and dirty cans. Streptococci, however, are invariably found in the milk obtained at the cowshed in at least 1-10th of a c.c. They are much more numerous in old cow-dung than in fresh, and they are found abundantly present in dirty cans. These organisms, contrary to glucose-fermenters, may be found in milk drawn directly from the udder, but not in abundance, their presence being often evident in 10 c.c., but seldom in such small quantities as 1-10th of a c.c. Again, they may be found in the air. From these last two sources the numbers are small, the greatest sources being old dung adhering to the cow, and dirty receptacles.

The extent of the presence of these two groups of organisms indicates generally, in the same way as the total bacterial content, want of care and uncleanly methods on the part of the milk producer and retailer. They bear a sort of relationship, and their significance is the same. Both glucose-fermenters and streptococci have the property of growing vigorously at warm temperatures, hence the necessity for cooling. The objections to a definite general bacterial standard for milk, already stated, prevail in the case of the glucose-fermenting group and streptococci.

As the test for glucose-fermenting bacteria is one which is very readily applied, and as the significance of streptococci is practically the

same, a guide may be suggested as regards the former group to the exclusion of the latter. For milk supplied to large towns and cities an arbitrary standard of the presence of glucose-fermenters in 1-100th of a c.c. should call for investigation, and for towns near the source of supply their presence in 1-10th of a c.c. of milk should have the same effect.

As regards bacillus enteritidis sporogenes one experiences great difficulty in coming to a definite conclusion. Nevertheless, I am inclined to think its presence of little value as an indicator of pollution. This organism is often found in milk, and even in milk of a low bacterial content. It is usually found in 10 c.c. of milk, but seldom in 1-10th c.c. Being a strict anaerobe, it does not grow under ordinary conditions, and, unlike most organisms, does not multiply in the milk at warm temperatures; so that if a certain number of these organisms gain entrance at the farm they will not be in greater number at the retailer's premises, unless some have been added in transit. The organism has been found by Hewlett, Balfour Stewart, and Glynn to be widely distributed in nature, and especially in dust. Its significance is thus questionable. It was found to be present in 10 c.c. in 75 per cent. of the Group A samples already quoted, which were otherwise good milks having a low bacterial count, while absent in the same quantity in others containing a larger number of bacteria. Its presence may be due to pollution by dust at the cowshed, at any place where the cans are stored or handled, or in the retailer's premises.

The test for the bacillus is far from being an accurate one, the inaccuracy being intensified by the small number of the organisms usually present. Without a knowledge of its exact origin and portent, it seems unwise to lay down any standard or guide.

4. *Sediment.*—The term sediment, or, as it is commonly called, dirt, is applied to the material which falls to the bottom of the milk on standing. It is composed of various elements: for example, vegetable fibres from dung, granular dust particles, hairs, pieces of straw, cellular debris, yeasts, and bacteria. Only a very small percentage consists of cellular debris, except in serious pathological conditions of the udder. In colour the deposit is usually dark grey or almost black, but when whitish it should call for special examination to determine if it consists of a great excess of

leucocytes, amounting practically to pus, a condition very rarely met with in mixed milks.

Its origin is chiefly dung or dirt from the flanks and udders of the cows, which dirt is shaken into the milk during the process of milking. Thomas states that the Chester city analyst, as a result of many control experiments, found that when fresh cow-dung was added to milk only one-eighth part by weight of the cow-dung originally added was recoverable as sediment, the remainder passing into solution in the milk. This is what one would expect with fresh dung, but it must be remembered that it is not fresh cow-dung which gets into the milk, but the old dung adhering to the hairs of the cow, which is hard, and contains less water, but which contains many more bacteria, all of which pass into the milk. I have already pointed out that the old cow-dung from the flanks of the cow may contain 7,000,000,000 bacteria per gram, many being glucose-fermenting bacteria and streptococci. Most of the deposit enters the milk at the cowshed, very little gaining admission during its journey to the consumer. If straining were not practised the test for sediment would be a valuable one as indicating the manner of production of the milk, since temperature and time do not affect the quantity.

Various methods of estimation have been suggested by Houston, Barwise and White, Foulerton and Delépine. That which I have found most reliable is a modification of Houston's, and consists of a glass cylinder holding more than a litre, tapering to fit inside a 10 c.c. centrifuge tube, to which it is connected by means of a piece of rubber tubing. The centrifugal tube is tapered at its lowest end and is graduated in 1-10ths and 1-100ths of a c.c. The graduated part holds up to 3 c.c. In making an examination of the sediment, 1 c.c. of formalin is first added to the milk to prevent souring and the growth of the organisms, and the mixture is then shaken up and poured into the cylinder up to 1,000 c.c. mark. A glass cover is placed over the cylinder and the whole allowed to stand for 12 hours—usually overnight. At the end of 12 hours, a brass rod fitted with a rubber stopper at the lower end is passed through the milk, and fitting into the outlet of the cylinder prevents escape of the fluid when the centrifugal tube is detached. This tube is centrifuged at a speed of 1,500 to 2,000 revolutions per minute for three-five minutes, and the milk poured off. Sodium carbonate solution (1 per cent.) is then

added up to the 10 c.c. mark, and the centrifugalizing repeated. The deposit is then read off. If the top of the deposit is not level it may be stirred up a little by means of a wire and again centrifuged. An apparatus dealing with half a litre of milk would be more convenient, but the graduated tube would require to be graduated in 200ths to give accuracy in reading.

It is now necessary to consider the significance of deposit in milk. First of all it may be said that it possesses no relation to the number of bacteria. The absence of deposit or the small amount does not indicate cleanliness in production, but its presence in excessive quantity indicates want of care and dirty methods at the cowshed. A good milk possesses little deposit, but a dirty milk may be strained by a fine gauze or cotton wool strainer to such an extent as to render it comparable with one produced under the best circumstances while retaining the deleterious matter, chiefly bacteria, from the dung which constitutes by far the greatest part of the sediment. Straining has no influence on the bacterial content of the milk; on the other hand, the process of straining may slightly increase the number of bacteria; for example, a piece of manure newly admitted to the milk may be washed constantly by the milk in straining, the bacteria being washed into the strained portion, the larger particles of debris being alone retained.

It may be worth while to consider the amount of sediment in milk produced in the ordinary way from clean and from dirty cows. Four estimations of the deposit from the unstrained milk of dirty and clean cows were made with the following results:—

	Dirty Cows.	Clean Cows.
A. Volumes per million	70	10
B. " " "	80	10
C. " " "	80	7.5
D. " " "	60	7.5
Average	72.5	8.7

Taking the average of these we find that when the cows' udders were not groomed, and it may here be said that the cows were not the grossly dirty cows so commonly found in cowsheds, the amount of sediment was about 8.3 times that found when the udders were cleansed. Therefore one is led to believe that if the process of straining were forbidden, a suggestion which is impracticable, the sediment

estimation would constitute an excellent test of the manner of production.

Houston has suggested a standard of 50 volumes of sediment per million. In 1908, as a result of my observations and experiments, I suggested a definite standard of 40 volumes per million of milk, a standard which I consider a very liberal one. This I proposed not as a means of bacterial estimation but as a test for extraneous matter which should not be there, and which is due to contamination from a cow kept in such a condition as to jeopardise the production of a milk of high bacterial purity. It has been objected that as regards the sediment, "a considerable part is composed of substances natural to milk, such as cellular contents, and also harmless inorganic bodies like sand, and these are a variable part of the whole." But cellular elements compose only a very small part of the deposit, and are amply accounted for in the amount of 40 parts per million. Should the observer suspect that the sediment is composed of cellular elements, from the white or light grey colour, the use of Eau de Javelle will soon confirm or dispel his suspicions. If there are inorganic bodies like sand, they should not be present, being evidence of pollution from a dirty udder, which often has sand particles adherent, or of contamination by dust. No doubt the imposition of a standard would tend to make the farmers and retailers more careful in straining, but that should not deter us from calling the greater attention of those handling milk to the necessity of cleanliness, or from imposing a penalty on those who should chance to produce milk with an excess of sediment. Every little helps in our crusade against unwholesome milk, and if we can impose a definite standard in such a case let us do so. The result, even if it consists only in more efficient straining, will not be to affect adversely the properties of the product, but to bring about one of greater æsthetic quality.

The estimation of sediment gives information which cannot be given distinctively by other methods of bacterial estimation. It shows irrefutably, if found in excess, that the milk has been obtained from a dirty cow and by uncleanly methods, and this cannot be indicated so definitely by bacterial methods. Herein lies its great importance. The standard of 40 volumes per million is one which I consider of great value, even though the beneficial results might not be all that one would wish, and the test is one which is easily and quickly applied.

Already a fair number of prosecutions for excess of sediment above 40 volumes per million, and estimated in the manner described, have met with success, the proceedings being taken under Section 6 of the Sale of Food and Drugs Act, 1875. In three cases in which convictions resulted the analysis of the third sample was carried out at Somerset House. Thus the application of this test is not precluded by virtue of the division of samples as necessitated under Section 5, Sub. 2, of the Milk and Dairies Act.

5. *Leucocytes*.—Milk invariably contains leucocytes, which are derived from the udder of the cow, and whose significance has not yet been definitely determined. The number present varies considerably in different milk supplies, and even in the milk from individual cows. Large numbers of these cells may be present in pathological conditions of the udder, both acute and chronic, and this knowledge has prompted observers to attempt to discover if a standard could be laid down as to the number which should be allowed.

The term "pus" has often been applied to these cells, but such a use of the term is unfortunate, as it is impossible to differentiate between a pus-cell and a leucocyte. Savage, who has particularly investigated this subject, remarks, "I cannot differentiate between a leucocyte and a pus-cell, and I am not prepared at this stage to lay down an arbitrary standard as to what number of leucocytes per c.mm. is to be designated pus in milk."

Stokes and Wegefarth first drew attention in 1897 to a method of estimating the number of, what they called, pus-cells in milk. Eastes, Bergey, Stewart and Slack investigated the subject and published very similar film methods of estimation. In 1905, the Doane-Buckley method for the estimation of the number of leucocytes by the Thoma-Zeiss hæmocytometer was put forward by Doane as possessing greater scientific accuracy than the others. Savage, quite independently of Doane's work, published about the same time a method practically similar, but perhaps more accurate.

Various standards have been proposed as to the number of leucocytes to be permitted, but these appear to have been based on insufficient data. Russel and Hoffmann, using the Doane-Buckley method, have shown that the subject requires further elucidation before any definite standard can be adopted. These observers found that the leucocyte content of normal milk, from apparently normal animals, was

often so high that the milk would be classed as coming from diseased animals when judged by the standards previously proposed. Although the number of leucocytes in the milk in pathological conditions of the udder is usually increased, yet this is not invariably true, the leucocyte count in some cases being less than in milk from normal udders. A numerical standard sufficiently high to include the great majority of healthy cows may be low enough to exclude some with diseased udders. Other more definite signs of inflammatory mischief of the udder must be sought. Savage in 1910, after extensive work on the subject, expressed his view, ".....leucocyte enumerations as far as individual cows are concerned are of great value. Rigid standards as to the number of leucocytes to allow in milk cannot be set up, but the count indicates the need for local investigation. With extended experience it may do much more than this. It gives definite information which inspection frequently cannot furnish, and the procedure reaches its highest utility when combined with a bacteriological examination of the milk." Again, he expresses the general view of investigators when he says in his book, "Milk and the Public Health," published in 1912, "It is certainly unjustifiable to lay down rigid standards of the number of leucocytes to permit in milk, as has been done by some American bacteriologists. When present in numbers more than 800 to 1,000 per cubic mm. they indicate the need for careful enquiry as to the local condition of the cow's udder." Although no definite standard can be prescribed the test can be carried out with comparative facility and with a working standard such as Savage suggests, it is one which should figure in any scheme for the supervision of the milk supply.

6. *Cooling*.—The question of a standard of cooling may be appropriately discussed here under the general subject of bacterial standards, inasmuch as cooling has a great influence on the bacterial content of milk, the extent of which influence I have already demonstrated. All are agreed that some form of cooling is desirable, but the question to be carefully considered is whether a definite or any standard of cooling is applicable in any or all cases. The importance of cooling is recognised in America, where in many of the cities the sale of milk at a temperature higher than 50° F. is prohibited. A temperature of 10° C., or 50° F., is what should be aimed at in this country. But, can this be attained? During the greater

part of the winter months the milk might be readily cooled at the farms to this temperature by means of the ordinary water supply, but during the summer months this temperature in most cases would be impossible without the use of ice.

The difficulty of obtaining ice in remote country districts, far from the towns where the manufacture of ice is carried on, is a serious one, its supply involving such an expenditure as to be prohibitive. If a demand could be established for ice possibly the cost of production might be lowered, and its greater use encouraged; but it would be unwise, and perhaps harassing to farmers, to make its employment compulsory at the present time. In the meantime, it could be laid down as a strict rule that all milk should be cooled at the farm to as low a temperature as is possible without any reference to a definite standard, and with water from deep wells a fairly low temperature may be attained. This requirement would perhaps encourage the use of ice in many cases where it is accessible.

If the temperature of the milk is lowered sufficiently at the cowshed, the temperature of the outer air does not affect it markedly during transit, except when exposed to the direct rays of the sun or in an excessively warm atmosphere. Savage, by experiments, found that milk, if initially cooled and placed in a churn, only very slowly rises to the temperature of the outside air. Thus, if the milk is thoroughly cooled at the cowshed it will during transit continue at a temperature sufficient to inhibit to a very large extent the organisms originally present.

One has less diffidence in imposing a standard at the retailer's premises in the town, and here I would suggest that a definite standard of 10°C., or 50°F., should be required for all milk kept for sale. This requirement would not affect rural or small urban areas where milk is not stored, but is delivered fresh every morning or evening, but would apply to populous places where most of the milk is kept stored on the premises preparatory to sale.

GENERAL STANDARDS.

After a general survey of the most common sources of contamination of milk, one is better able to pass under review what I call, for want of a better term, general standards. These I understand as relating to the general construction of the cowshed, construction and general arrangement of the retailer's store or shop and general methods of handling, from the time

the milk leaves the cow until it reaches the consumer. Up to the present the production of a wholesome milk supply, and control over the milk producer and retailer, have been hampered by the want of uniformity throughout the country of the regulations with respect to the conduct of the milk trade.

The disadvantages of the lack of uniformity are so well recognised by all who are interested in the subject of pure milk that it is needless for me to discuss them further. It is essential, if the control is to be effective, and our efforts successful, that the same requirements should be in force uniformly in rural and urban districts. At the cowshed definite standards of cubic space, lighting, and ventilation should be required; a plentiful supply of boiling water, apart from the usual household supply, for cleansing the utensils; a suitable milk-room or store of proper construction, disconnected from the cowshed and also from the dwelling-house; cleanliness of the cows to such an extent that they shall be kept groomed and their udders and haunches free from manure; cleanliness of the milker, including the hands; the use of suitable utensils and their scrupulous cleanliness; the general cleanliness of the cowshed and milk-room; and, above all, a water supply which is beyond reproach. With respect to the retailer's premises, here again a plentiful supply of boiling water should be insisted upon, also a satisfactory milk-room or store disconnected from a dwelling-house or workplace, and of such construction as to be free from dust. The sale in a milkshop, milkstore, or dairy of other articles, excepting certain things specified, should be prohibited. Again, milk should be kept in suitable covered receptacles, and the whole conduct of the milk trade should be one of scrupulous cleanliness. Milk carts should be kept clean, and the general arrangements of delivery should be satisfactory. One point which I consider of vital importance, is that no one should be permitted to sell milk unless he has a suitable milk-store and sufficient provision for cleansing the cans.

It is of the greatest importance that the requirements should be definite and unequivocal, and that nothing be left either to the local authority or to the medical officer, on which he may act arbitrarily. One important suggestion is that a copy of all regulations should be exhibited in the cowshed or retail premises, in the same way as the requirements under the Factory and Workshop Act must be exhibited in the workshop or factory. Lastly, if under

the Milk and Dairies Orders a register, designed to include all the important matters dealt with by the regulations, were prescribed for use by inspectors, a more effective supervision would be the result.

CERTIFIED MILK.

The term "Certified Milk" is of American origin, the movement for the supply of certified milk having been initiated in 1892 by Dr. Henry L. Coit, of Newark, N.J. Since then, Medical Milk Commissions have arisen in many cities in the United States, and even an Association of Milk Commissions has been formed with a view to arriving at definite standards and promulgating information regarding certified milk. Although only a small proportion of the milk supply of the towns where there are milk commissions is certified, yet the movement is making sure and steady progress. In Mr. Wilfred Buckley we have an ardent advocate of certified milk in this country, and both he and Dr. Ralph Vincent have been prominent in showing what can be done towards the production of a satisfactory and wholesome milk supply. Dr. Vincent, at his farm, has shown that with conscientious care, and with the exercise of intelligence, a milk of high bacterial purity can be obtained in ordinary buildings. This farm, which has for its object the supply of pure milk for the Infants' Hospital, London, is managed by a board of control, and has been able to furnish milk of the highest grade at something less than 3d. per quart. Thus, certified milk should be possible commercially at a reasonable price.

No elaborate buildings are necessary, but what is required is careful management by one who has an intimate knowledge of, and recognises thoroughly, the factors influencing the quality of the milk both chemically and bacteriologically. As to standards, those adopted by the American Association of Medical Milk Commissions are worthy of consideration. They provide for what may be enumerated shortly as the health of the cows, including veterinary inspection and tuberculin testing; the sanitary condition of the milk cans, utensils, and clothing of the milkers; the suitable construction of utensils; sanitary methods of milking; the extent of cooling; the cleansing and sealing of bottles; a water supply of irreproachable quality; and bacterial and chemical standards. Here we need only consider one or two of these matters.

The American Association of Milk Commissions in 1912 adopted a bacterial standard of

10,000 bacteria per c.c. This standard has also been proposed by the American Commission on Milk Standards, a body composed of some of the most prominent authorities on milk hygiene and public health in the United States, and appointed by the New York Milk Committee. In a report issued by the United States Public Health Service a list of eleven towns is given where a standard has been adopted, the number of bacteria allowed being in one case 15,000 per c.c., in two, 20,000, and in the remaining eight, 10,000 per c.c. As pointed out in an earlier part of this paper, a milk with a bacterial content not exceeding 10,000 per c.c. can be readily obtained. Dr. Vincent's farm gives a milk varying in content from 2,000 to 6,000 bacteria per c.c. The standard of 10,000 bacteria per c.c. might therefore be adopted in this country. As to the chemical standards, those adopted by the American Association are 4 per cent. of fat, with a permissible range of from 3.5 to 4.5 per cent., and a protein standard of 3.5 per cent. with a permissible range of 3 to 4 per cent. As to fat, the standard of 4 per cent. seems too high in this country, as at certain times of the year the farmer would experience great difficulty in complying with it. Perhaps a minimum of 3.5 per cent. fat would be fair to the farmer and desirable so far as the purchaser is concerned. In this country the protein standard is not in common use, the casein being designated by the inclusive term "solids non-fat," and here possibly one can lay down the standard of 8.5, this making, with the fatty solids, a "total-solids" standard of at least 12 per cent.

The degree of cooling specified by the association is that the milk should be cooled immediately after milking and maintained at a temperature between 35° and 45° F. until delivered to the consumer. This standard is in no way too low, and certainly should be adopted for certified milk in this country.

As regards the veterinary inspection and tuberculin testing of the cows, I feel strongly that the system suggested by Bang should be insisted upon, in order that the purchaser of certified milk may rely on obtaining a tubercle-free product. Moreover, the compulsory adoption of Bang's method of dealing with tuberculosis in the stock would be an object lesson, and would be a great step in the direction of the education of the general body of farmers.

The delivery of certified milk of guaranteed purity, in sealed bottles, is likely to create a

demand amongst a certain class of the community, and its popularity will doubtless stimulate interest amongst milk producers and encourage its increased production, while at the same time much valuable information as to the cost and general conditions will be forthcoming, to enable us to direct our energies the more intelligently in dealing with the general or ordinary milk supply.

REFERENCES.

- Barwise and White. (1906.) *Jr. of Royal San. Inst.*, Vol. XXVII., No. 7.
 Bergey. (1901.) *Amer. Med.*, Vol. I.
 Bergey. (1904.) *Pennsyl. Dept. of Agric.*, Bull. 125.
 Conn. "Dairy Bacteriology."
 Conn. (1903.) *Storr's Agric. Expt. Sta.*, Bull. 26.
 Conn and Esten. (1904.) *Rockefeller Inst.*, Reprints, Vol. I.
 Conn and Esten. (1905.) *Rockefeller Inst.*, Reprints, Vol. III.
 Delépine. (1903.) *Jr. of Hygiene*, Vol. III., No. 1.
 Eastes. (1889.) *British Med. Journ.*, Vol. II.
 Eastwood. (1909.) *Report on American Methods for the Control and Improvement of the Milk Supply.* L.G.B. Rpt., New Series, No. 1.
 Eyre. (1904.) *Jr. of State Medicine*, Vol. XII., No. 12.
 Foulerton. (1907.) *Report to Finsbury Public Health Committee* (kindly sent by Dr. Newman).
 Freudenreich. (1902.) *Cent. f. Bakt.* II., Bard. VIII., pp. 674-681.
 Glynn. (1901.) *Thompson Yates Lab. Reports*, Vol. III., part 2.
 Harrison. (1905.) *Cent. f. Bakt.* II., Bd. XIV., 12, 13.
 Harrison. (1896.) *Ontario Agric. Coll. Report*.
 Hewlett. (1899.) *Trans. Journ. Inst. Prev. Med.*, ii.
 Houston. (1905.) "Bacteriological Examination of Milk." London County Council Report.
 Lane-Clayton. (1912-1914.) *Reports to L.G.B.* New Series, Nos. 63, 76.
 Lauder and Cunningham. (1913.) *Report XXVIII.* Edin. and East of Scotland College of Agriculture.
 MacConkey. (1905.) *Jr. of Hygiene*, Vol. V., No. 3.
 MacConkey. (1906.) *Jr. of Hygiene*, Vol. VI., No. 3.
 Moore. (1895.) *Ann. Report*, Bull. An. Indust.
 Orr. (1908.) *Report on an Investigation as to the Contamination of Milk*, Yorkshire Joint Committee.
 Parks. (1900.) *Lancet*, Vol. I.
 Park. (1901.) *Jr. of Hygiene*, Vol. I., No. 3.
 Rosenau. "Milk and its Relation to Public Health." Bull. No. 56. *Public Health and Marine Hospital Service of the U.S.*
 Russell. "Dairy Bacteriology."
 Russell and Hoffmann. (1907.) *Jr. of Inf. Diseases*, Supp. 3, May.
 Savage. (1906.) *Jr. of Hygiene*, Vol. VI., No. 2.
 Savage. *Bacterial Measurement of Milk Pollution.* Rpt. to the M.O.H. to the L.G.B. (1909-1910).
 Savage. "Milk and the Public Health." *McMillan & Co.*, 1912.
 Schultz. (Quoted by Eyre.)
 Schweinitz. *Report upon Examination of Milk.* Ann. Rpt. Bureau of An. Indust., 1889.
 Shroeder and Cotton. *U.S. Bureau of Animal Indust.*, Bull. No. 99.
 Slack. (1906.) *Jr. of Inf. Diseases*, Supp. 2, Feb.
 Slack. (1907.) *Jr. of Inf. Diseases*, Supp. 3, May.
 Stewart, Balfour. (1900.) *Thompson Yates Lab. Reports*, Vol. III., Part I.
 Stocking. (1903.) *Storr's Agric. Exper. Station.* Bull. No. 25.
 Stokes and Wegelarth. (1897.) *Jr. of State Medicine*, Vol. V., No. 9.
 Swithinbank and Newman. (1903.) "Bacteriology of Milk."
 Vincent. (1911.) "On the Production of Pure Milk." P. S. King & Son.

DISCUSSION.

DR. BOSTOCK HILL spoke of the necessity of improving the conditions under which milk was produced and sold, and the difficulties, even if standards are laid down, to enforce these standards in practice. He thought that, generally speaking, greater care is now taken in milk production than formerly. On the subject of pasteurisation, he felt that while present conditions prevailed, pasteurisation was desirable. He thought that the disadvantage of using pasteurised milk had been greatly exaggerated.

DR. BOOBYER desired to associate himself with Dr. Bostock Hill in speaking of the advantages, under present conditions, of pasteurisation. Dr. Boobyer had investigated a list of 490 children, including his own children, who had been brought up on boiled milk, and failed to find anything in evidence of any ill effects from this diet. On the subject of dirty milk, Dr. Boobyer had had great difficulty in dealing with this. He had found that, punitively, they were almost helpless. He had seized dirty milk as unfit for food, but had had to give it up. He had had to fall back on moral suasion. Dr. Orr had spoken of cooling milk at the farm. However desirable this might be, he had found large farmers who said this was impracticable. The Americans were much in advance of us in this matter. On the subject of chemical standards, we want the public to expect that if milk is sold as food it should be produced up to the proper standard.

DR. MILLER, speaking on the question of sediment, thought that this should be dealt with before adopting bacterial standards. He thought that we ought to seek a higher standard of cleanliness in regard to the service of the cows and the milkers, and that milk-producing premises should be registered annually, the registration being made dependent on their cleanliness.

DR. DRYBURGH GOLD was so thoroughly in agreement with the substance of Dr. Orr's paper that to him no point appeared controversial. The primary essentials were cleanliness in production, and until these were enforced the setting up of bacteriological standards was not likely to lead to much improvement; nevertheless such standards might reasonably in time be established.

DR. CLENDINNEN had hoped that Dr. Orr would have spoken of the possibility of keeping cows out in the open altogether, or in open sheds.

DR. ORR replied shortly. His whole thesis was—Do not put forward pasteurisation as against cleanliness. Pasteurisation had often been a failure in America and elsewhere. In Denmark it was used universally, even to the extent of pasteurising the milk used for butter.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856.

RECONSTRUCTED 1888.

INCORPORATED 1892.

Scottish Branch.—A meeting was held in the Station Hotel, Perth, on Saturday, April 24th, 1915, commencing at 11.30 a.m. *Present:* Drs. Robb, Buchanan, McNaughton, Robertson, Adam, Clark Trotter, Graham, Matthew Hay, Ernest Watt, and Bruce.

Apologies for absence were received from Drs. Macdonald, Maxwell Ross, Miller, Chalmers, Williamson, McIntosh, and Oliver.

The minutes of the last meeting were read and approved.

The correspondence since the last meeting was intimated by the Secretary. A letter from Professor Harvey Littlejohn was read expressing his thanks for the sympathy of the Branch on the death of his father.

A number of Branches intimated the nomination of a President of the Society for the Session 1915-16.

The SECRETARY intimated that, after repeated requests, he had obtained from the Parent Society an extra grant of £5 for the Session 1914-15.

A general discussion on tuberculosis schemes was then commenced, and was taken part in by all the members present. DR. MCNAUGHTON was able to inform the meeting that at the present time the Local Government Board were not approving of any arrangements made by local authorities for the payment of doctors for the attendance upon non-insured persons suffering from tuberculosis, but that the Board was in communication with the Treasury on the subject.

During the discussion some members emphasised the difficulties which arise from persons suffering from tuberculosis living in unsatisfactory home conditions. Members were able to cite many instances where it was impossible for the patient to have a room or even a bed for himself. It was felt that a difficulty in controlling the spread of tuberculosis arose from the fact that it was not at present competent for local authorities to give any financial assistance to patients to enable them to obtain better housing accommodation. As the Local Government Board allow the local authorities to provide shelters, it was felt that it was only logical that the Board should allow local authorities to assist patients to get suitable houses where the provision of a shelter was impracticable.

The Secretary was instructed to communicate the opinion of the Branch to the Local Government Board, and to press for an extension of the powers of the local authorities in this direction,

more especially as it seems likely at the present time that the erection of additional institutions for the treatment of pulmonary phthisis is likely to be delayed.

One of the members present drew attention to the fact that under the present constitution of the Society it was not possible for superintendents of sanatoria and infectious diseases hospitals to become members of the Society unless they possessed a public health qualification. The opinion was expressed that men who might be very desirable members of the Society were thereby excluded from the privileges of membership. The Secretary was instructed to write to the Parent Society suggesting that at the first opportunity the constitution should be amended to allow of the admission of such men as members of the Society.

The CHAIRMAN raised the question of the further postponement of the Milk and Dairies (Scotland) Bill, 1914. He explained that it was likely that some of the bodies interested in the measure would press for a further postponement of the date on which the Bill came into operation. It was left to the Chairman to take what steps he considered necessary to intimate that the Branch had no objection to such a postponement.

The meeting then terminated with a vote of thanks to the Chairman.

Southern Branch.—A meeting was held at 1, East Park Terrace, Southampton, on Friday, May 7th, 1915. There were present:—Dr. Legate (in the chair), Drs. Duncan Forbes, C. W. Hutt, A. Ashkeny, Oscar Holden, Arthur G. Troup, E. A. F. Wilkes, Lockhart Livingstone, C. J. Galbraith, J. C. Hoyle, R. A. Lyster, R. Maples, J. P. Walker, James Fenton, R. E. Lauder, H. L. Hamilton, A. Mearns Fraser and as visitor Dr. D. C. Adam.

The minutes of the last meeting were read and confirmed.

Letters of apology were announced from Drs. Lockhart Stephens and Dr. Nankivell. The HON. SECRETARY announced with regret that he had received notices of the deaths of two members of the Branch, Dr. Alfred Pern, of Botley, and Dr. Gilbert Elliott, assistant county medical officer of health of Hampshire.

THE PRESIDENT (Dr. Legate) proposed, DR. LAUDER seconded, and it was resolved, all those present standing, that the sincere sympathy of the Branch be conveyed to Dr. Lockhart Stephens and his family on the great loss he has sustained through the death of his son in action.

It was proposed by DR. R. E. LAUDER, seconded by DR. FENTON, and resolved, that it is desirable in the interests of the Society for assistants to attend the meetings, and that medical officers of health should do their utmost to allow their

assistants to attend all meetings. It was further directed that a copy of this resolution be sent to the Council of the Society with a recommendation that it be sent to all the Branches in the hope that the principle would be generally adopted.

Dr. Duncan Forbes, associated with Dr. D. C. Adam, presented a paper on "Cerebro-spinal Meningitis." This was followed by an interesting discussion, which the following gentlemen took part in—Drs. Lyster, Hoyle, Wilkes, Holden and Hutt.

Dr. FRASER proposed and Dr. LAUDER seconded, and it was resolved, that a hearty vote of thanks be accorded to Dr. Forbes and Dr. Adam for their very instructive and interesting paper. Dr. Lauder was also thanked for the use of the room.

It was decided, after discussion, that the next meeting be held at Southampton.

Metropolitan Branch.—This Branch met on Friday, April 23rd, 1915, at 3 p.m., at 1 Upper Montague Street, Russell Square, W.C.

The President (Dr. Kenwood) occupied the chair, and amongst those present were Drs. Bond, Parkes, Thomas, Wellesley Harris, Howell, Sidney Davies, and Charles Porter (hon. sec.).

The PRESIDENT opened a discussion on "The Methods to be Adopted and the Tests to be Applied in connection with the Examination of Tinned Foods." He gave a description of a series of experiments carried out in his laboratory with the object of discovering the most satisfactory and most easily applied test, and after replying to a number of questions raised in the course of the discussion, promised to embody the results of the investigations in a paper.

MILITARY APPOINTMENTS.

DR. J. W. BEATTIE, the S.M.O. of Sunderland, has been appointed medical officer in charge of a hospital ship, with the grade of Captain.

DR. DOYLE, M.O.H., of Colne, has received a Commission in the R.A.M.C.

DR. THOS. STRAIN, formerly M.O.H. of Houns'low, now holds a commission as Lieutenant in the R.A.M.C. He is at present the Camp Sanitary Officer at Witley, Milford, Frensham, Thursley, and Uplands.

CIVIL APPOINTMENTS.

DR. WM. J. COX has been appointed acting medical officer of health and medical inspector of schools of the borough of Luton, during the absence of Dr. William Archibald on military service.

DR. W. W. HELLVER has been appointed M.O.H. of Aberavon.

DR. T. C. MITCHELL has been appointed M.O.H. for the Wath R.D.C.

DR. PETER JONES has been appointed M.O.H. to the Abergale U.D.C.

LAW REPORTS. HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.

July 13th, 1914.

BEFORE DARLING, J.

WEIR v. THOMAS & ABSON.

Unsound Meat—Information of Sanitary Officials not communicated to Purchaser—Alleged Negligence—Public Authorities Protection Act, 1893.

When sanitary officials are informed that unsound meat has been consigned to a purchaser as poultry food there is no duty placed upon them to inform such purchaser that the meat is not fit for human consumption.

The defendants in this case were the medical officer of health for the Metropolitan Borough of Stepney and the principal sanitary inspector of that borough. The plaintiff was the managing director of the East London Produce Co., Ltd.

It appeared that certain cases of canned meat were condemned by the sanitary authority for Glasgow as unfit for human food. They were consigned to the plaintiff as "rejects" at 4/- a case, the usual price being 29/- if the meat was sound. The usual invoice stating that the meat was "poultry food only" had been omitted. The sanitary officials at Glasgow informed those of Stepney of the condemnation of the cases, and that they had been consigned to the plaintiff's company for the purpose of re-sale as poultry food.

The plaintiff alleged that it was the duty of the sanitary officials to have told him that they had received this information, and thereby have prevented him from selling meat unfit for human food.

The plaintiff did sell certain of these tins for human consumption, with the result that he was convicted for offences under the Public Health (London) Act, 1891, at the instance of the Stepney Borough Council.

The defendants pleaded that they owed no such duty as alleged to the plaintiff, and also that the action was barred by the Public Authorities Protection Act, 1893, inasmuch as it was not brought within six months of the date of the alleged grievance.

DARLING, J., was of opinion that the defendants were entitled to succeed on both points. In the course of his judgment he said: His complaint, and the whole of his complaint, is that the medical officer of health for Stepney did not assume, having bought the stuff which was unfit for human food, that he would be rogue enough to sell it, as he did, as fit for human food, and that he did not foresee that the plaintiff would break the law and did not give him a warning that he was not to break it. It seemed to him quite plain that the plaintiff here had failed to establish any cause of action whatever.

Public Health

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No. 10

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SUMMER DIARRHŒA.

AT the present time there rests a very heavy responsibility on those who devote their lives to matters affecting the public health of the community, and in the coming summer months this is likely to be increased by the outbreak of epidemic diarrhœa in infants.

The clinical picture of the disease is familiar to all; the number of sunken-eyed, pinched-faced, emaciated infants that are found in the poorer parts of our cities, and which throng to the casualty rooms of our hospitals leaves indelibly printed on our memory a picture of the fearful ravages of the disease.

The etiological facts underlying the epidemic, even to-day remain, however, at best, in a very unsettled state.

From an epidemiological point of view, the most prominent factor which plays a part in the causation of diarrhœa is the high mean temperature of the atmosphere. The prevalence of a mean temperature of 60°F. for a week has seemed to be the point at which the epidemic commences, but how this high atmospheric temperature acts is entirely unknown. Various careful observers have urged that flies, more especially house flies, are among the main agents in the spread of epidemic diarrhœa in warm weather. Hamer, however, in his report to the London County Council in 1908, came to the conclusion that flies could not be the sole agents for the conveyance of summer diarrhœa from patient to patient, because flies were found in houses in the late autumn after the epidemic had ceased. Copeman has made the interesting suggestion that with the onset of cold weather flies were more sluggish in this latter portion of their existence, and therefore were less likely to infect either milk or infant. Most observers have held that milk was the chief carrier of epidemic enteritis. At the Hospital for Sick Children, Great Ormond Street, statistics show that 96 per cent. of the infants up to the age of nine months who died of diarrhœa were

being hand-fed, only 4 per cent. were being entirely breast-fed at the time of onset of diarrhœa. Since 1890, when the enormous bacterial contamination of milk began to be appreciated, the opinion has prevailed that it was in this the real cause of the prevalence and fatality of diarrhœal diseases in summer was to be found. This belief carried with it the expectation that by furnishing to every artificially fed infant clean fresh milk, or milk which had been pasteurized or sterilised, this great cause of infant mortality would be largely removed.

Much has been accomplished in this direction, but the investigations undertaken by the Rockefeller Institute, in co-operation with the Health Department of New York, show that the bacterial contamination of milk is certainly not the only factor to be considered. The number of bacteria which milk may contain before it becomes noticeably harmful to the average infant in summer is not at all uniform; usually no striking deleterious results were seen until the number approached one million per c.c. Above this point injurious effects were usually manifest; below it other factors, rather than the number of bacteria, seemed of greater importance in producing diarrhœa. Thus, in condensed milk prepared with hot water the bacterial contamination was relatively small, yet the results were almost as bad as with the most highly contaminated milk. No relationship could be discovered between any special forms of bacteria present in the milk on the health of children, nor in the production of any special form of summer diarrhœa. The effect of heating milk gave striking results. It was shown unmistakably that in hot weather raw milk at the time of feeding, highly contaminated with bacteria, caused illness in a much larger number of cases than when it had been previously heated. Although raw milk has certain bactericidal powers, and mere numbers of bacteria appear to count for much less than was supposed, the fact should not be overlooked that milk abounding in bacteria,

because of careless handling, is also always liable to contain pathogenic organisms derived from human or animal sources, and therefore the strict supervision of our milk supply is of very great importance.

Considered from a bacteriological point of view, a very considerable amount of research has been made into the bacteriology of summer diarrhoea, but up to the present no causative micro-organism has been established with absolute certainty. The difficulties experienced by the bacteriologists are many—*e.g.*, the variabilities in severity of the cases in the same season, and different season, the difficulties of accurately differentiating the true summer diarrhoea of children from others occurring during the epidemic season. In different countries, the clinical picture of summer diarrhoea varies—in London blood and mucus are rarely, if ever, found in the stools, whereas in New York they invariably contain mucus and, as a rule, blood.

These clinical distinctions are associated with differences in the bacteriological flora. In America it has been shown that in those cases of summer diarrhoea where mucus was present in the stool, the dysentery bacillus (Flexner type) could be isolated in practically every case. The bacteriology of summer diarrhoea in London has been worked out very carefully by Morgan and Ledingham. These observers paid particular attention to the non-lactose fermenting group of micro-organisms of patients suffering from summer diarrhoea, and reported that a certain bacillus (Morgan's bacillus) had been proved by them to occupy a predominant position among the non-lactose fermenters, and considered that this bacillus was an important etiological factor in the disease in view of its association, its pathogenicity, by feeding and otherwise, and the serum reactions on the part of the infected hosts. In selected cases of the disease it has been isolated in the very high percentage of 63, a proportion which compares very favourably with that obtained, *e.g.*, in typhoid fever. It has also been isolated in a small proportion of healthy children, both during and apart from the epidemic season, and in a still smaller percentage of adults. Other observers have confirmed the presence of this bacillus in the dejecta of patients suffering from summer diarrhoea, but there is not complete unanimity among them that this bacillus is the essential factor of the disease. These investigations are further complicated by the fact that non-lactose fermenting micro-organisms are found in

increased numbers in epidemic diseases other than those associated with intestinal disturbances, and it may well be, therefore, that too great a concentration has been given to this group of micro-organisms in epidemic summer diarrhoea. Another line of investigation—the examination for a filterable virus—in the hands of S. Martin and others has already given interesting results. They find that filtrates of cultures and of the dejecta produce a fall of temperature, collapse and diarrhoea in rabbits and monkeys. The possibility that epidemic disease is due to a filterable virus is one that merits further investigation.

Other investigators hold that the disease is primarily caused by interferences with normal digestion and metabolism so as to lead to the formation within the body of injurious substances which excite diarrhoea, or may favour the excessive growth of bacteria ordinarily present in the digestive tract, the role of bacteria being a secondary, although a very important, one. According to this hypothesis, the cause of the diarrhoea is not something produced from without, but something produced within the body itself.

In view, therefore, of the afore-mentioned divergent views, it will be obvious that the complete elucidation of this distressing epidemic disease has not yet been obtained. The same variabilities and similar difficulties have been experienced before, and we make no doubt that the continued research of investigators will ultimately, and indeed soon, lead to a successful decision against the baby-killing enemy. That this decision may be reached quickly, it is of paramount importance that every opportunity should continue to be taken during the coming months to make every recognisance which will reveal the source and nature of the enemy. A tendency in the past to work in specialized watertight compartments has probably done much to foster that kind of enthusiasm which is dangerous in medicine; a larger co-operation between workers holding different points of view would indubitably lead to a better proportioned outlook, and therefore to a speedier, accurate conclusion. Certain it is that never has it been more necessary for the country to work with both sword and trowel than at the present time.

THRIFT IN FOOD SUPPLIES.—The Society of Medical Officers of Health hopes that medical officers of health will direct the attention of their authorities to this subject, which was discussed at the meeting of the Society, reported in the present number, with a view to all local voluntary associations being utilised for the purpose of carrying out the objects of the meeting.

NOTES ON CASES OF EPIDEMIC CEREBRO-SPINAL MENINGITIS.

By DUNCAN FORBES, M.D., D.P.H.,
Medical Officer of Health and School Medical Officer of Brighton; and
DANIEL COLVILLE ADAM, M.B., D.P.H.,
Medical Officer of the Borough Sanatorium, Brighton.

UP to the 3rd of May, 45 cases of epidemic cerebro-spinal meningitis have been treated at the Borough Isolation Hospital. Of these cases 19 were sent to us from the army and 26 were from the civilian population. Besides the cases mentioned, 21 patients were sent to hospital as cases of the disease or doubtful cases of the disease, but later were proved to suffer from other ailments.

ETIOLOGY.

AGE INCIDENCE.—As the numbers dealt with in Brighton are small, a table is given of the age incidence in the Belfast epidemic:—

YEARS	0-1	1-5	5-20	20-40	40-60
NUMBER OF CASES	88	198	263	70	8
AVERAGE PER YEAR	88	49	18	2	1/2
DEATH RATE	77.1 %	80.8 %	73.8 %	90 %	87.5 %

It would appear that the younger a person is the more readily is he attacked. The distribution of cases at the various age periods was more equal in Brighton.

SEASONAL INCIDENCE.—The greatest seasonal incidence is usually in the spring of the year, and appears to be associated with circumstance and weather favourable to catarrhs and colds.

SANITATION.—Overcrowding, whether in dwellings, huts or places of entertainment, seems to favour the spread of the disease. On the other hand, the disease rarely spreads in well-ventilated rooms, and it is uncommon for nurses attending cases to be attacked by the disease.

INFECTIVITY.—Chalmers found in the Glasgow epidemic that multiple cases occurred in from four to eight per cent. of the households attacked. In scarlet fever the corresponding figures for Brighton are 14 per cent. At times two or more members of a household are attacked simultaneously; Robb, of Belfast, notes such an instance, in which five children were taken ill within ten hours of each other, and within thirty hours four of them were dead. In Brighton we have been able to trace direct infection in only four cases. Two children

played in a room of a neighbour's house in which a case of the disease was being nursed; both children took the disease and died. They in their turn appear to have infected their brother, who was attacked the day after their removal to hospital. In one case a girl of three slept with her mother, who suffered from the disease. She sickened two days after her mother was removed to hospital.

Most of the cases, however, had not been in contact with known cases, and it is now generally, and we believe correctly, assumed that the infection is carried from one person to another by healthy carriers. The diplococcus is known to be present in the nasopharynx of many healthy contacts. From this position the organism easily escapes into the air if the carrier coughs, sneezes, or talks loudly. The infection is probably principally a spray infection, although direct contact may play a part. Large numbers of persons who inhale the spray are infected and in their turn infect others. As the organism is said usually to remain in the nasopharynx of any one person for a period of three weeks or less, it is easy to understand the difficulty of tracing the spread of infection.

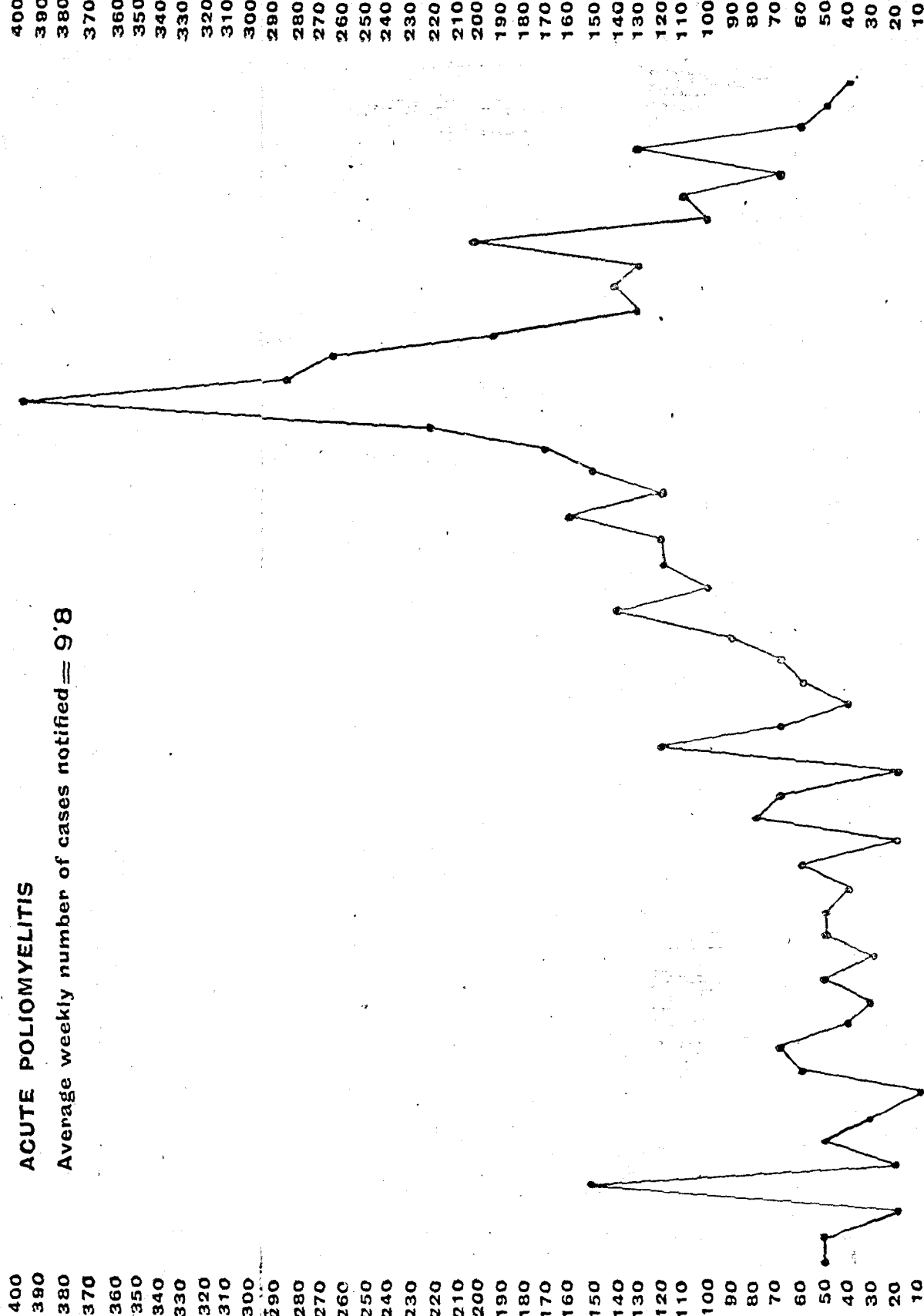
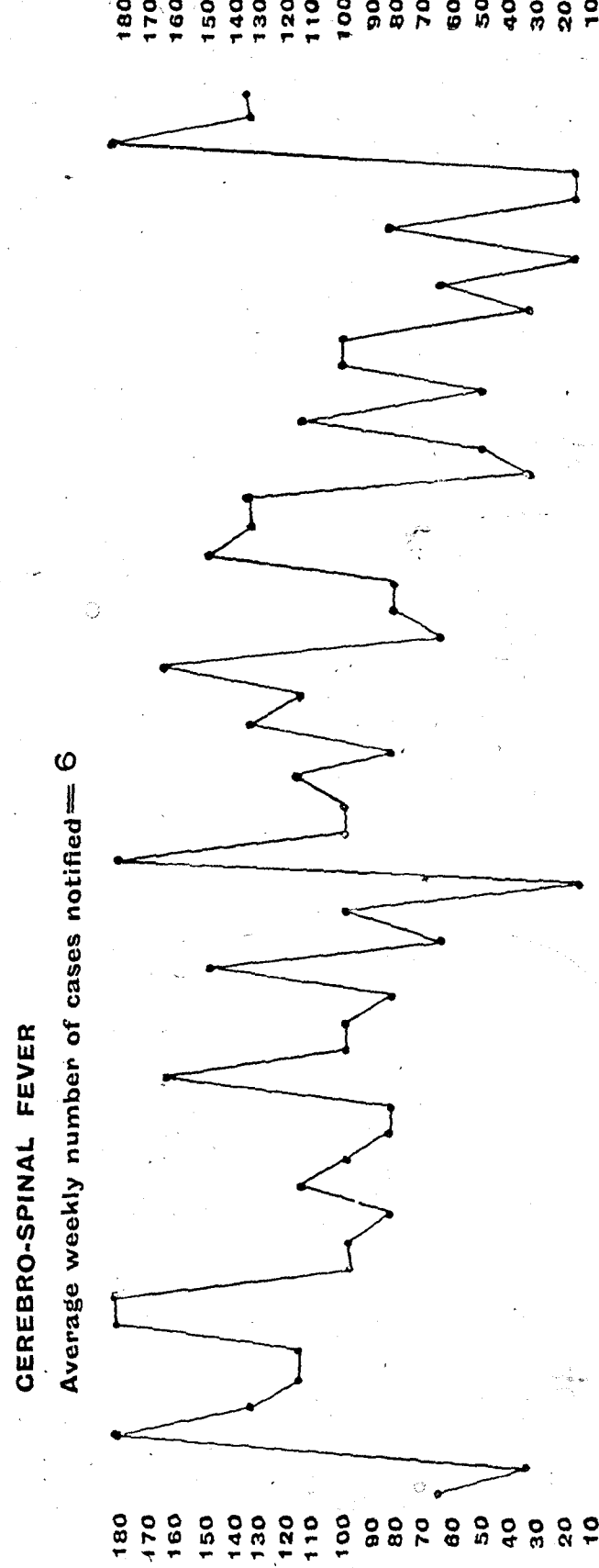
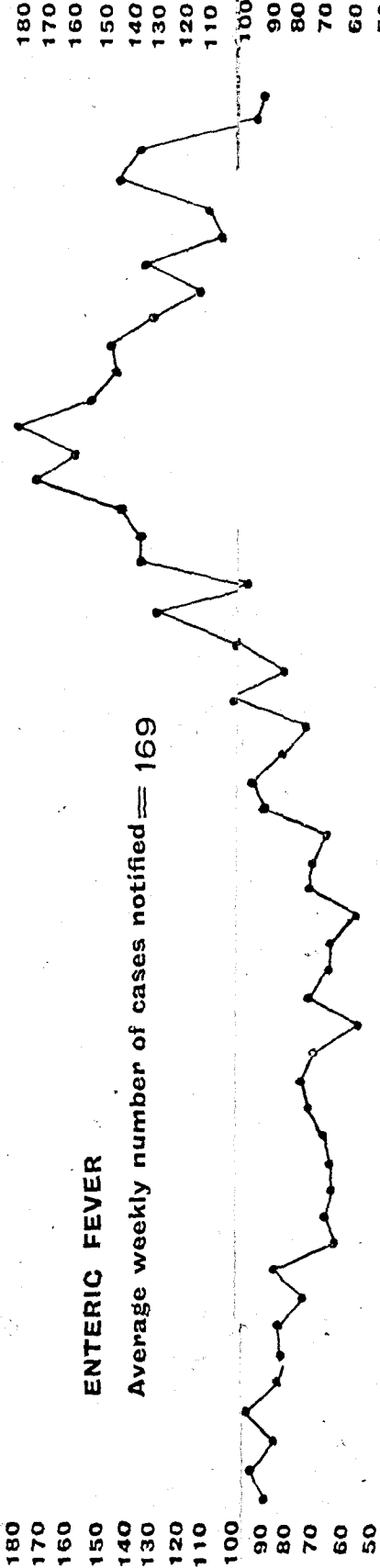
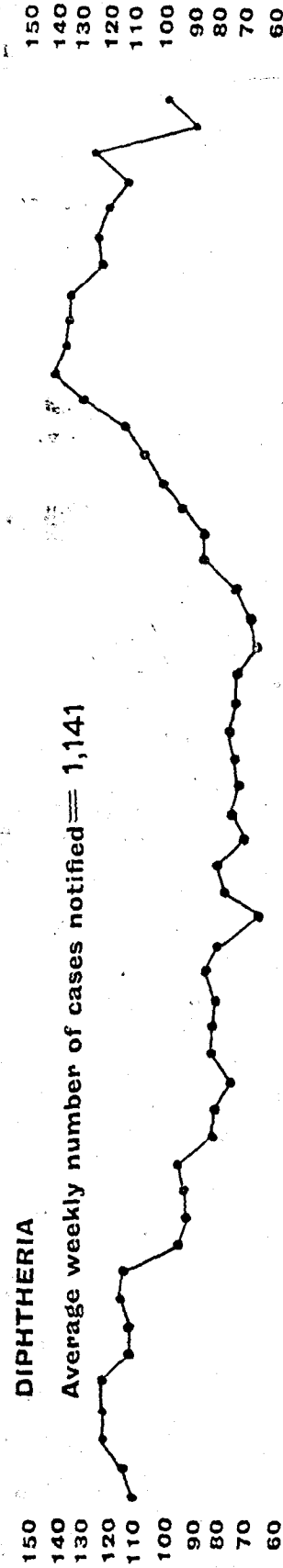
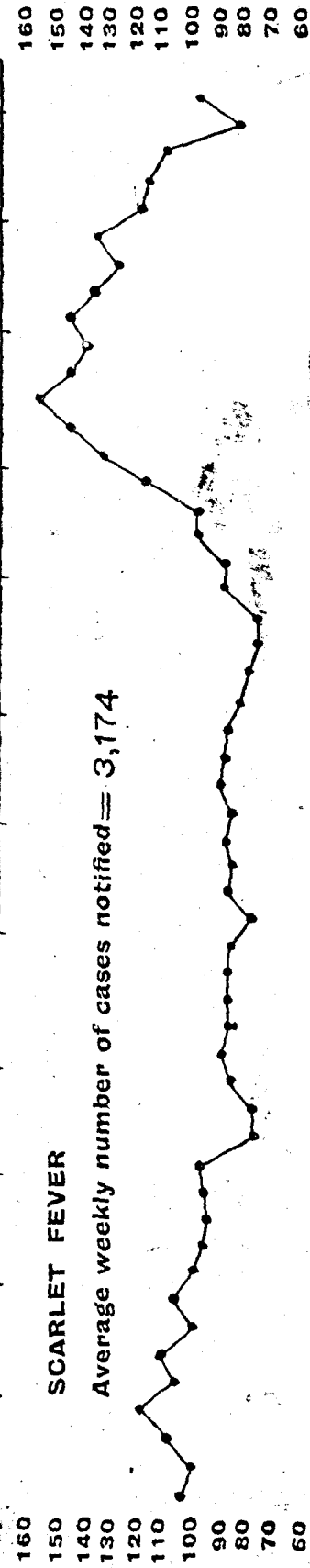
PATHOLOGY.

Only a small percentage of those infected develop the disease, and we believe its development to be largely a matter of chance. Given the diplococcus in the nasopharynx a large number of them, especially in the presence of a catarrhal condition, are ingested by leucocytes. Some of these leucocytes find their way directly or indirectly to the blood stream. In the blood stream the infected leucocytes may be carried to any part of the body, but by chance may be carried to the brain and there emigrate to the subarachnoid space. If our hypothesis is correct, head injury would predispose to attack. What suggested this theory to us was the finding of many leucocytes in the cerebro-spinal fluid breaking down and evidently setting free large numbers of organisms.

We believe that there is no septicæmia proper preceding the brain infection except in so far as a few diplococci-carrying leucocytes in the blood can be called a septicæmia. On the other hand, after multiplication of the organisms in the spinal fluid, we can quite understand the presence of a septicæmia, indeed the infection of joints early in the illness seems to point to some degree of septicæmia being of common

CURVES EXHIBITING SEASONAL DISTRIBUTION OF NOTIFIED CASES OF INFECTIOUS DISEASE
ENGLAND AND WALES 1914.

	JANUARY			FEBRUARY			MARCH			APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER			OCTOBER			NOVEMBER			DECEMBER			JAN										
10	17	24	31	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19	26	2



	JANUARY			FEBRUARY			MARCH			APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER			OCTOBER			NOVEMBER			DECEMBER														
	10	17	24	31	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19	26	2

In this Diagram the number of Cases in each week is shown in proportion to
the mean weekly number taken as 100.

occurrence. Transference of the disease by fleas and lice is possible, but more work will have to be done before any definite opinion can be expressed on this matter.

In the post-mortem examinations we found that the main deposits of fibrino-purulent material were in the region of the pons and upper part of the medulla. From the pons there were extensions to the cerebellar surface, the optic chiasma and the surface of the cerebrum along the sylvian fissure. The site of the principal deposits explains the frequent involvement of the sixth and eighth nerves.

THE CEREBRO-SPINAL FLUID.—In examinations of the fluid from seven cases in which the meninges were not affected we found that the fluid was clear, gave no deposit on centrifuging, contained 0.25 per cent. or less of albumen, but contained an amount of sugar varying from .416 to .665 grammes per litre. On the other hand, in the acute stage of epidemic cerebro-spinal meningitis the fluid was hazy, cloudy or turbid, on standing some time it was found to contain a fibrinous web-like structure and at times a deposit; it gave from .1 to .85 per cent. of albumen, and contained no sugar or a relatively small amount of sugar—from 0 to .14 grammes per litre. In convalescents the fluid becomes clear again. In certain chronic cases which end fatally, the fluid becomes clear and yellow and quickly coagulates on standing. A similar fluid is present in certain cases of tuberculous meningitis. In both these fluids mono-nucleated cells may predominate, so that the leucocytic content does not aid one in the differentiation of the two diseases.

On microscopic examination, the fluid from an acute case is found to contain large numbers of leucocytes with the polymorphs predominating; the percentage of polymorphs is usually well over 75 per cent. In only one case in the acute stage was the percentage below 75, the percentage being 51 of polymorphs and 49 of lymphocytes. In one of our cases of tuberculous meningitis polymorphs outnumbered the mono-nucleated cells.

The organisms are usually easily found, but at times they are discovered only after a long search. Their numbers are not relative to the number of polymorphs present; a hazy fluid may be crowded with organisms whilst a turbid fluid may contain relatively few organisms. If the organisms are not discovered in the first specimen, further specimens should be stained and examined. The organisms are principally

intracellular, but in severe cases extracellular organisms may predominate. In the cell the organism may show evidence of being dissolved, at times losing its diplococcal form, at other times staining lightly; on the other hand, large numbers of well-stained, well-defined organisms may be found. At times, as previously mentioned, the leucocyte is breaking up and the organisms are being set free in the fluid.

THE ILLNESS.

The course of the disease can best be understood by associating it with the presence and multiplication of organisms in the cerebro-spinal fluid.

SHOCK.—At the onset the number of organisms is relatively small, but their presence leads to a congestion of the vessels, with exudation of serous fluid and leucocytes. This widespread inflammatory reaction gives rise to headache, neck stiffness, vomiting and other early symptoms; and, in addition, the sudden irritation and pressure on the cerebral centres result in many cases in unconsciousness and, in a lesser number, in paralysis. This primary unconsciousness, even when accompanied by violent delirium, is not necessarily associated with severe illness or fatal results; its cause is partly mechanical and is relieved to some extent by lumbar puncture and the reduction of pressure. If the organisms remain scanty, the widespread primary inflammation becomes less intense and consciousness is recovered in the course of two or three days. In the fulminant case the patient appears to die from this intensive primary reaction.

INCREASE IN THE NUMBER OF ORGANISMS.—The organisms may remain scanty throughout a long illness, but at any time they may suddenly greatly increase in number. (See diagrams on pages 230-232.) In fulminant cases they are found in great number within 24 hours of the onset. Increase in the number of organisms, if it occurs, may be delayed for some time, and the longer it is delayed the more favourable the prognosis. The increase is accompanied by more severe headache and neck rigidity. The patient seems to be overwhelmed by the headache, shouts and groans and becomes less sensible, the fatal cases usually becoming quite unconscious before death. The increase of organisms may be rapidly overcome, both leucocytes and organisms disappearing in the course of two or three days, the temperature at the same time falling to, and remaining, normal.

On the other hand, the organisms may remain more or less numerous for some time, the illness being prolonged.

The usual course of the disease is indicated above, but there are many exceptional cases; some, for instance, die although the organisms remain scanty throughout.

EARLY SYMPTOMS.

The onset is, in a majority of cases, sudden. There was a history of *sore throat* prior to the onset in 22 per cent. of the cases. This sometimes occurred as much as a fortnight before the onset. The value of this observation was lessened by the presence of many illnesses with sore throat about the time when the majority of cases occurred.

Headache occurred in every case during the first 24 hours and always remained severe for a few days. Usually the headache was frontal, just over the orbit, and occipital.

Pain in the neck was frequently complained of.

Vomiting. There was a history of vomiting on the first or second day in 92 per cent. of the cases in which a history was available. It frequently continued for three days, but was most severe on the first day of its occurrence. In one case it occurred on two successive days prior to the onset.

Shivering was a marked early symptom in one-fourth of the cases. It nearly always occurred on the first day, and at times preceded the headache.

Unconsciousness and delirium. Sixty-nine per cent. of our patients suffered from some degree of unconsciousness and delirium in the first few days of their illness; the remainder were sensible throughout. If unconsciousness becomes deeper after the first day of its occurrence the prognosis is very grave; at the same time, as previously mentioned, cases with wild delirium and unconsciousness may later rapidly convalesce. Of the patients who remained sensible during the first week only 31 per cent. died.

In only two cases, aged four months and three years, was the illness ushered in with convulsions.

Pain or stiffness in legs. The first symptom in one man was pain in the legs, thought to be due to his puttees. One man had pain in the knees and was blistered for this condition. Seven others complained of pain or sudden weakness in the legs. In two of our cases there was a history of the patient getting out of bed and later

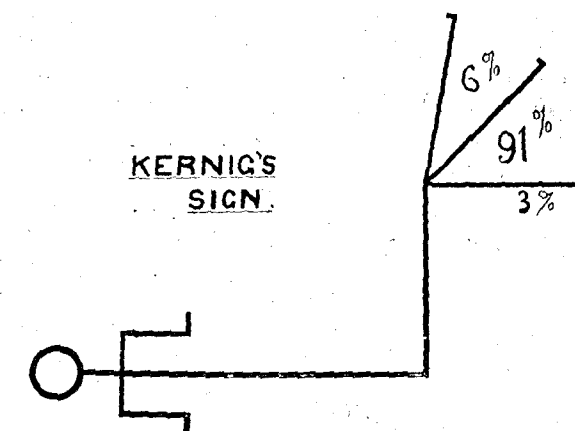
being found upon the floor; in one case the patient was unconscious when found, in the other case dazed.

Abdominal pain occurred in one case on the first day.

EARLY SIGNS.

Neck rigidity is invariably present in the early stage if the patient is conscious. In only three cases was this important sign absent. Two of the cases were deeply unconscious and one was semi-conscious. The last developed marked rigidity when consciousness returned.

Kernig's sign is invariably present and usually persists throughout the illness and well into convalescence. As shown in the accompanying diagram, in all excepting six per cent. of the cases it was impossible to extend the leg beyond an angle of 45 degrees.



THE RASH.—A petechial rash alone, or a rash, many of the spots of which contain petechiæ, is most common. In the latter case none of the spots may at first show petechiæ.

The petechiæ are usually the size of a pin's head, but may be as small as the punctæ of flea bites. At times larger hæmorrhagic spots develop, these being most commonly found on the trunk near the shoulders and on the thighs and legs. We have observed the rash on all parts of the body and extremities, including the soles of the feet and palms of the hands, but we have had no case in which it appeared on the face. Hæmorrhages have been found on the palpebral and ocular conjunctivæ and also on the mucous membrane of the cheek. In no case have the petechiæ shown the bathing-drawer distribution peculiar to small-pox. From the following table one gathers that a majority of the cases have no rash, also that

petechial and hæmorrhagic rashes have no grave prognostic significance:—

Rashes.	No. of Cases.	Per-centages.	Case Mortality.
Large hæmorrhages and petechiæ ...	5	12	40 per cent.
Petechiæ alone ...	11	26	27 "
Other rashes ...	2	5	50 "
No rash ...	24	57	
	42	100	

Herpes occurred in thirty-eight per cent. of our cases. It was usually facial, occurring about the lips and along the line of the supra-orbital nerve.

Tache cerebrale. A decided reaction was obtained in less than one-third of the cases. We attach no importance to this sign.

Strabismus. Twenty-eight per cent. of our patients suffered from unilateral squint; in all cases this was due to a paresis of one or other external rectus muscle.

Deafness was well marked in twenty-one per cent. of the cases. It was an early sign, and usually there was more or less complete recovery. In only one case does complete deafness appear likely to be permanent.

Congestion of the conjunctiva was noted in forty-five per cent. of the cases.

Joint swelling occurred in twelve per cent. of our cases. One patient had swelling of the joints late in his illness accompanied by a mitral organic murmur. All the others recovered perfectly. The knee and ankle joints are the joints commonly affected.

PROGNOSIS.

The prognosis broadly varied with the number of organisms found in the spinal fluid. In all cases of death, with one exception, organisms were found in large numbers at one time or another. In the two most rapid cases, dying within a day of the onset, they were found in enormous numbers. Similarly they became, and remained, numerous in the cases which did not recover consciousness before death. On the other hand, fatal chronic cases frequently had few organisms in their spinal fluid in the first fortnight of their illness. Later, however, the organisms became numerous. Sometimes in chronic cases, which are evidently becoming worse, as previously stated, one finds the usual cloudy fluid replaced by a yellow, at times clear fluid, in which organisms may apparently be absent. This yellow fluid becomes like a jelly on standing even for a short time, coagulation taking place in less than ten minutes in one case. In no case in which such

fluid has been found have we had a recovery.

Apart from the presence of a large or small number of organisms in the fluid the most reliable guide is the headache and rigidity of the neck. If these remain marked the case must be regarded as a serious one. In cases with continued headache and temperature, apparent loss of self-control with shouting and groaning is a grave sign. One was at first inclined to associate this sign with an irritable nature, but it seems really to indicate serious disease. Commonly such patients, although quite sensible at first, gradually begin to ramble very much and may later become unconscious and finally die.

A continued normal temperature usually indicates that the case has been cured; on the other hand, mild cases frequently continue to have a temperature for about a fortnight.

The prognostic significance of unconsciousness and of hæmorrhagic rashes have been alluded to earlier in this paper.

DIAGNOSIS.

To every rule there are exceptions, but it would be safe to say that epidemic cerebro-spinal meningitis is not present if there is not a history of more or less severe headache during at least the first few days of the illness. But, however severe the headache and however long continued, meningitis may be almost certainly excluded except there is more or less rigidity of the neck.

This sign should be elicited in the following manner:—

The patient should lie flat on his back, and the doctor should stand at the head of the bed; placing his hands on each side of the patient's head, he should then roll the head forwards moving the chin towards the sternum. In practically every case there will be distinct resistance to this movement. If for any reason it is impossible to elicit this sign in the way described, it may also be demonstrated by placing one hand on the occiput and the other under the chin and then attempting to flex the head on the chest. The reason we describe this method so carefully is because the head in some cases can be moved freely in other directions; it is therefore of importance that it should be held and manipulated in such a manner that it is moved forwards in the middle line of the body. We wish to emphasise that whilst in meningitis there is limitation of the

straight forward nodding movement, lateral and rotatory movements may be free.

Not only is the absence of this sign of value in excluding a large number of persons suffering from severe headache, but its presence seems definitely to indicate meningitis or mechanical irritation of the meninges. All our cases showing this sign have suffered from epidemic or tuberculous meningitis with one exception, in which there was a hæmorrhage into the ventricles with a wide diffusion of the blood over the surface of the brain in the sub-arachnoid space.

The value of this sign for diagnostic purposes is enhanced by the fact that it persists often for quite a considerable time after the headache has disappeared. We found in several cases that the cerebro-spinal fluid had cleared and become free from meningococci before this sign had passed off. The absence of rigidity of the neck in cases of severe headache, or with a recent history of severe headache, may therefore be taken to exclude meningitis.

As previously mentioned, in patients who are unconscious there may be no rigidity during the period of unconsciousness, but it appears when the patient recovers consciousness. Rigidity may also disappear when the patient is under a general anæsthetic.

KERNIG'S SIGN.—Kernig's sign was present in all our cases. We consider it a sign of great value. It persists after the headache and rigidity of the neck have disappeared, and can often be elicited well on in convalescence.

VOMITING.—Early vomiting, more particularly in adults, is of importance, as in adults it is not of frequent occurrence in other acute febrile illnesses.

A hæmorrhagic rash, petechial or consisting of petechiæ and hæmorrhages, if present, is a valuable guide. It enables the observer to differentiate epidemic from tuberculous cerebro-spinal meningitis.

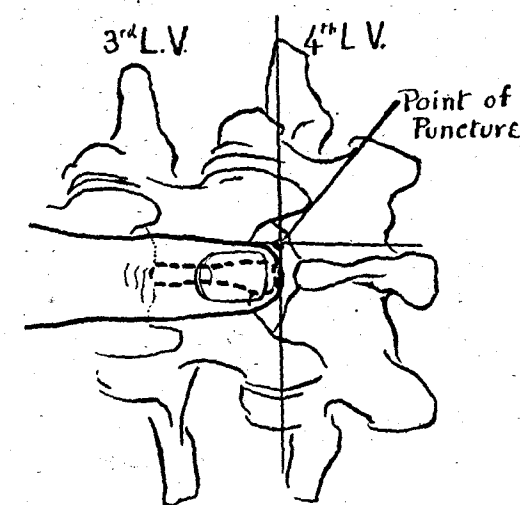
LUMBAR PUNCTURE.—In all cases of doubt lumbar puncture should be performed. In this connection it is well to remember that the cord at birth reaches to the third lumbar vertebra, and in the adult to the lower part of the body of the first lumbar vertebra. In an infant, therefore, one would not risk puncturing higher than the third lumbar space, whilst in an adult the higher spaces are available if necessary.

The patient should lie on the left side, with the thighs well flexed on the abdomen and the spine bent as much as possible in order to increase the width of the spaces between the

laminae. It is usually more convenient to have the patient under a general anæsthetic, and for this purpose chloroform is very suitable and is well tolerated.

An antitoxin needle of moderate calibre and about 3½ inches long is required. The site chosen is the space between the third and fourth or that between the fourth and fifth lumbar vertebrae, usually the former.

We should like to draw attention to the method of lumbar puncture advised in text books as we have found it unsatisfactory. It is correctly stated that a line joining the highest points of the iliac crests crosses the spine of the fourth lumbar vertebra. It is advised, however, that having selected a space the needle should be introduced at a point half-an-inch to three-eighths of an inch from the middle line and directed forwards, inwards and upwards. In practice we have found it best to introduce the needle rather nearer to the middle line, immediately below the level of the spine of the third or fourth lumbar vertebra, and to direct it straight forwards and very slightly inwards and not upwards at all. We illustrate our method as

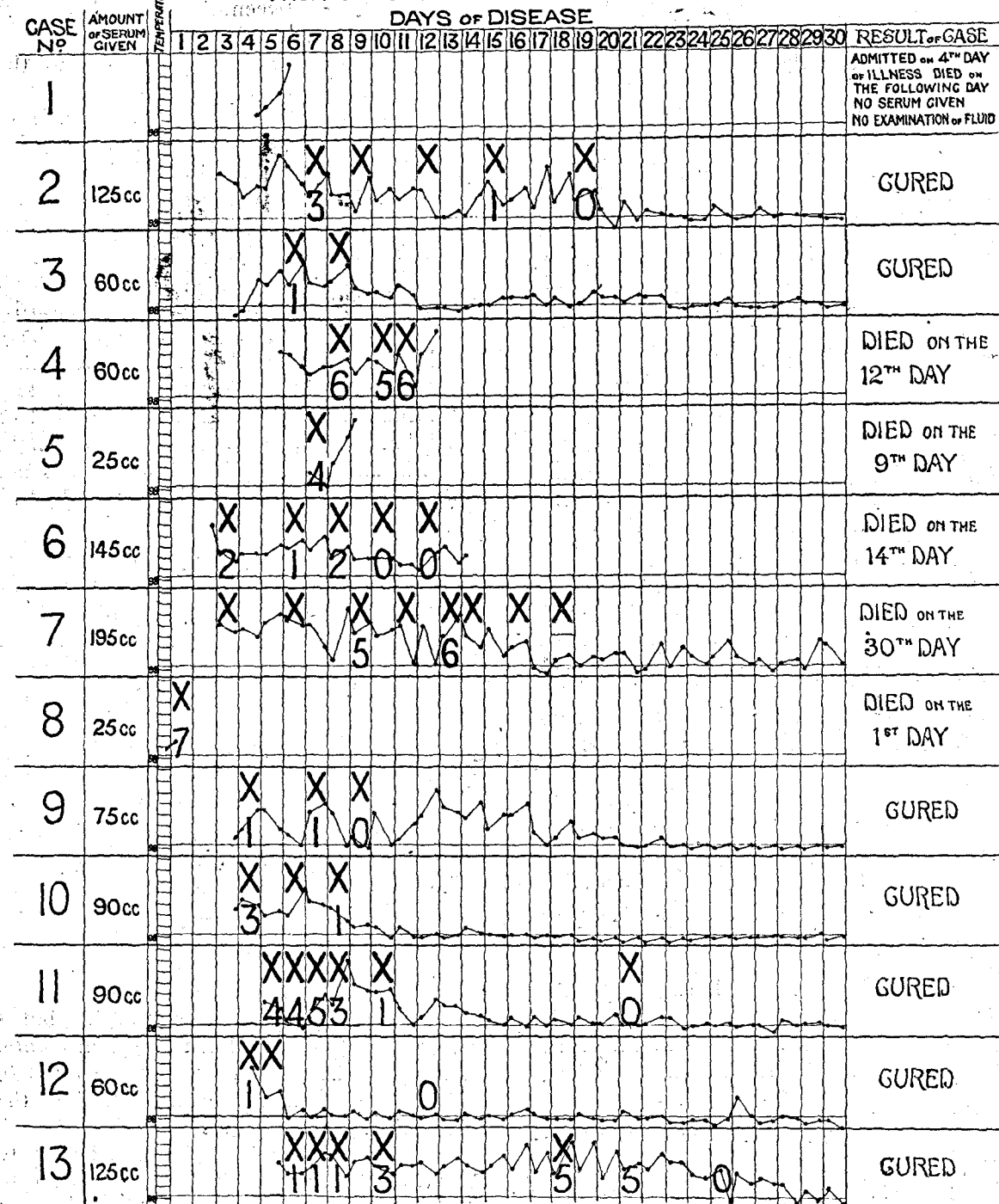


we found by experience that anything but a strict adherence to it led us to frequent failure. In children the ligaments are not so tough, and the needle should be introduced in the middle line.

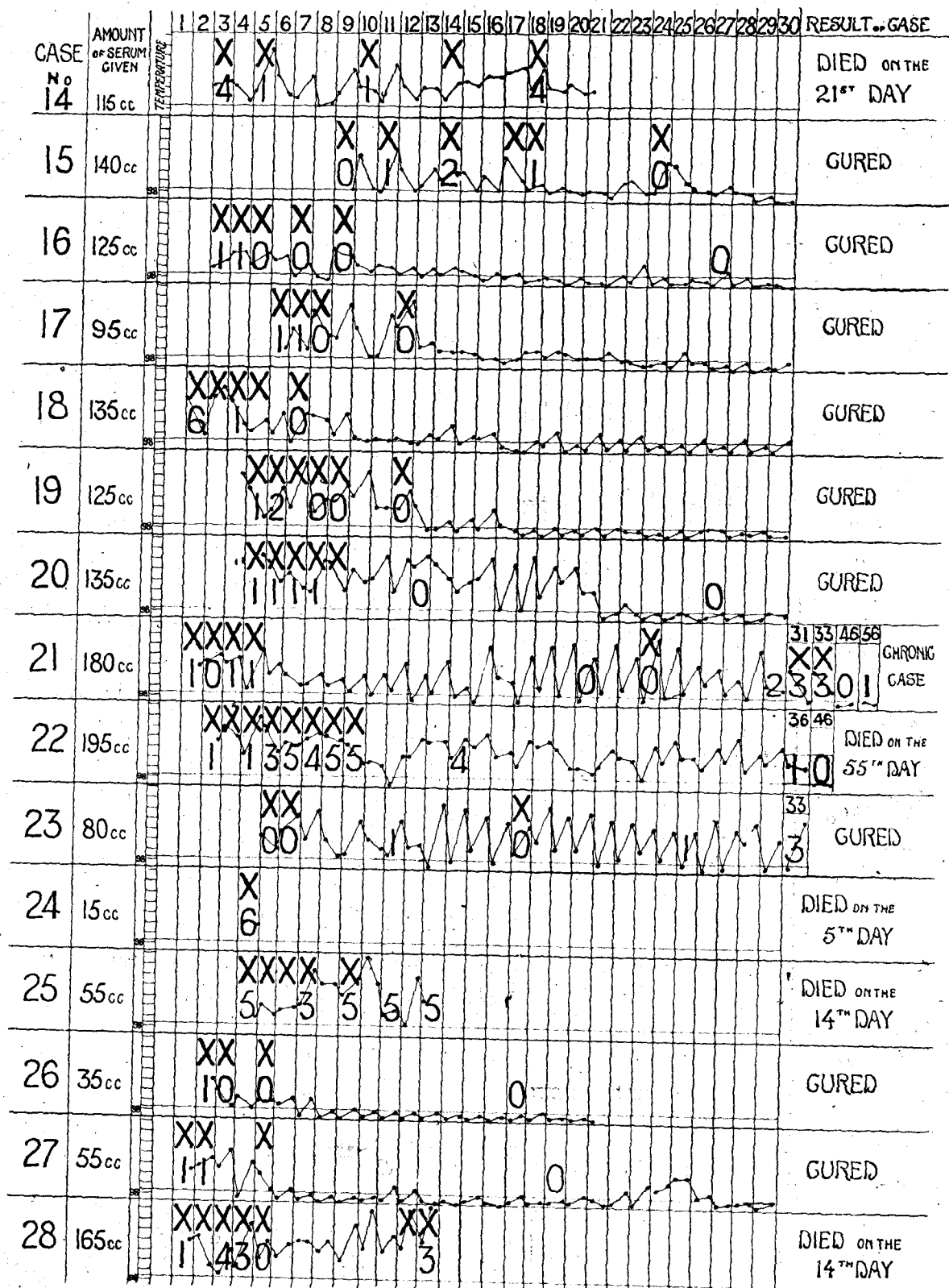
If fluid is not obtained this may be due to the needle having been introduced too far, to blockage of the needle, or perhaps to the inlet being obstructed by a nerve root; these difficulties may be overcome by slightly withdrawing the needle, by the use of a stylet, and by rotation of the needle. If these manipulations

X SHEWS DAYS INJECTIONS WERE GIVEN
FIGURES SHEW RELATIVE NUMBER OF COCCI FOUND

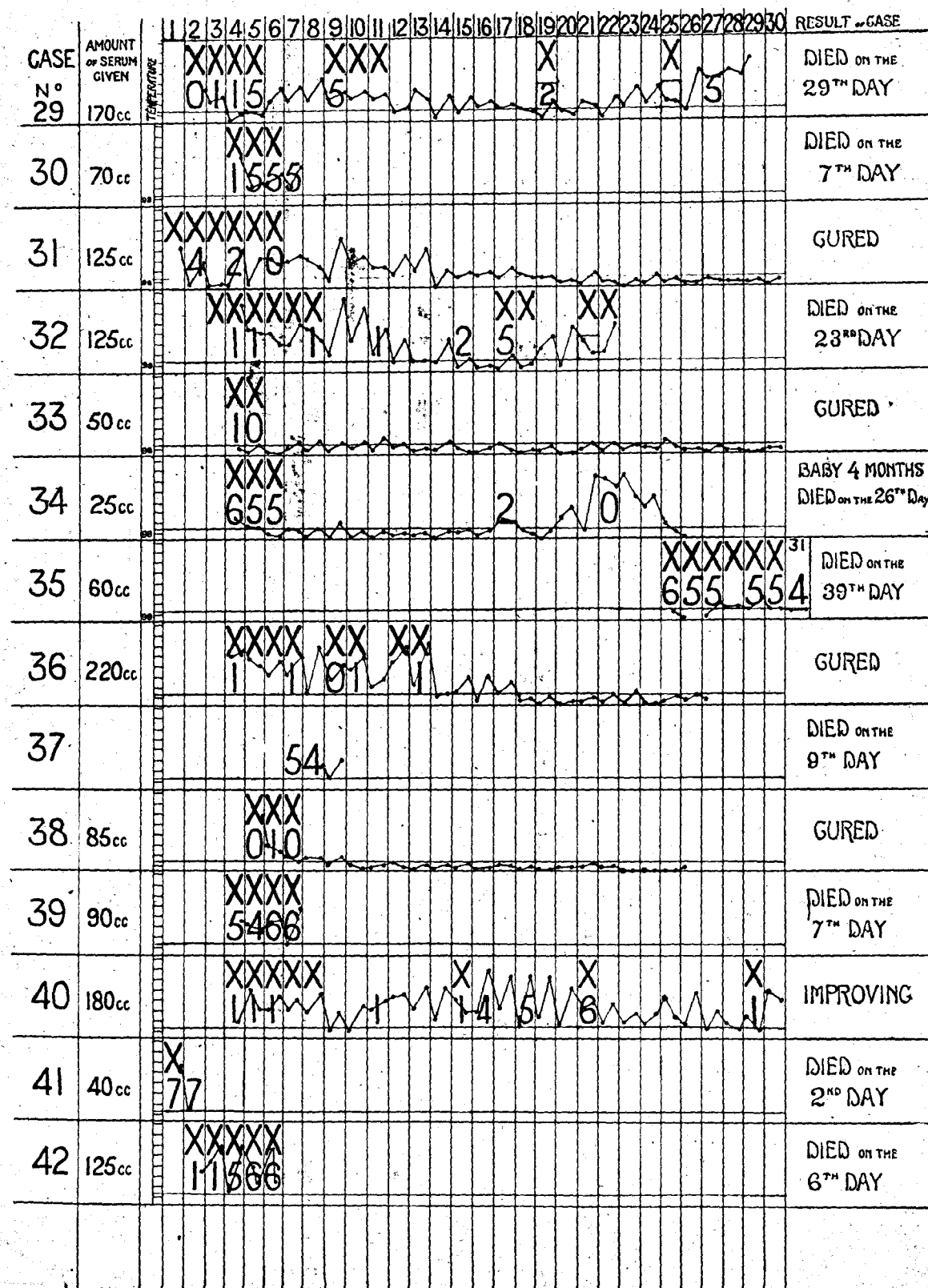
FROM 0=ABSENT TO 7=VERY NUMEROUS



CASE 7.—Cerebro-Spinal Fluid yellow on 18th day.



CASE 22.—Cerebro-Spinal Fluid yellow on 36th day.



CASES 29 & 32.—Cerebro-Spinal Fluid yellow on 19th and 21st days respectively.

CASE 34 died from an intercurrent attack of Measles.

are not successful the needle should be withdrawn altogether and re-introduced in one of the higher spaces.

Another point regarding lumbar puncture is that at times instead of the cerebro-spinal fluid, what appears to be pure blood flows from the needle. In two cases of cerebral hæmorrhage blood flowed freely on puncture. In the majority of cases the presence of blood is due to the perforation of a vein, and it is best in such cases to withdraw the needle slightly, and if the blood continues to flow to remove the needle altogether and puncture again in a higher space.

A sharp needle should always be used, as the dura which is not attached posteriorly is apt to be pushed before a blunt one.

The twenty-one cases which were proved not to suffer from the disease are classified as follows:—

Influenza and influenza associated with	
tonsillitis	...
Tuberculous meningitis	...
Other forms of tuberculosis	...
Cerebral hæmorrhage	...
Vaccinia	...
Enteric fever	...
Cerebral tumour	...
Other diseases	...

TREATMENT.

We take it that with a mortality of 45 per cent. we cannot either extol or disparage our methods of treatment. At first, being unable to procure serum, we tried urotropine in fifteen grain doses every four hours; after this treatment had been continued for seven days the patients developed hæmaturia with pain on micturition.

The drug was given on the assumption that formalin was disengaged in the spinal fluid with bactericidal effect; although formalin was found in the urine it was not discovered in the cerebro-spinal fluid (Dr. Adam). Later we tried an American serum prepared by Mulford's, and an English serum prepared by Burroughes Wellcome, these were given in 30 c.c. and 25 c.c. doses respectively.

Excluding cases which did not receive serum and those which died on the day of admission there remain thirty-seven serum treated cases, of which fourteen died, giving a mortality of 38 per cent. Our results are given in a diagrammatic form, and it will be seen that in many cases, in spite of a liberal administration of serum, the organisms increased in number.

As the prognosis varies with the number of organisms found this is a very disappointing result. The increase of organisms which frequently follows the first few doses of serum may be due in some small part to the withdrawal of fluid from the spinal canal and its replacement by fluid from a higher level containing a greater number of organisms. If the serum had been bactericidal, however, a rapid disappearance of both organisms and leucocytes should have followed its use in a majority instead of in a small minority of the cases.

Although we have been disappointed in the bactericidal effects of the sera employed, we are still of opinion that they are of benefit to the patients. We base our belief partly on the relatively low mortality and partly on the low incidence of chronicity and permanent sequelæ.

These favourable results may be due to a mechanical action of the serum in reducing the density of the fibrinous deposits on the brain; but equally, they may be due to a mild type of disease. Our results in no way compare with those of Flexner, which were as follows:—

No. of cases 400.

Treatment began	Cases.	Mortality.
1-3 days	123	16.5 %
" 4-7 "	126	23.8 "
" later	112	35.0 "

It is intended in future to use a serum prepared at the Lister Institute; the horses from which the serum is obtained having been immunised against strains of diplococci actually found in this epidemic. As there are many strains of the specific organism, and as serum prepared by immunisation against one strain may agglutinate only a small percentage of other strains, it seems reasonable to expect the most favourable results from the serum of a horse immunised against strains obtained from cases occurring in the present epidemic.*

THE USE OF SEDATIVES.—In wildly delirious cases the head symptoms seem to be relieved by lumbar puncture, but in many less severe cases this is not so, and it is necessary to have resort to drug treatment. In cases with only a mild degree of headache and insomnia a combination of chloral hydrate and potassium bromide is useful; when the headache is severe morphine is one of the few drugs that has any effect. In cases in which there is marked delirium we have noticed that the best results attended the use of hyoscine.

* Since writing this article serum from the Lister Institute has been tried without apparent beneficial results.

DISCUSSION.

DR. R. A. Lyster said:—The mortality of cerebro-spinal meningitis is usually stated to be a high one, but I am personally very doubtful whether it is truly a high mortality, or whether we are assuming a death-rate based on the few severe cases which are brought to our notice. Personally I am inclined to the opinion that for every case notified there are at least ten other cases unnoticed, and probably of a very mild character. If this is the case, it means that the disease does not produce by any means an excessive mortality. The liability of attendants to become infected is becoming more recognised, and the local experience has been that many such cases have arisen, but probably with reasonable precautions they could all be prevented. The precautions would include the use of a mask and the spraying of the nose and throat of the attendants regularly. We shall have to be prepared for the production of persistent carriers of this disease in much the same way as the persistent carriers of diphtheria have been recognised amongst us for many years. One of the most peculiar points of this disease is the number of cases in which a definite sudden onset is described. Some profound nervous shock appears to take place in a good number of cases, resulting in some cases in the sudden onset of insensibility and in others in the production of screams for help. Kernig's sign has not been a reliable diagnostic feature of the epidemic in this county. It is a variable sign, and is present in some instances only just before death. In other instances it is present at times and disappears at other times. I regard it as unreliable, and not worth very much attention when absent. The rash is very variable, and in the Hampshire epidemic has been mostly very slight or absent. Squint also is a variable factor, and in numbers of cases has been present only just before death. The most reliable and characteristic sign of the disease is the rigidity of the neck and shoulders, accompanied by headache. I have found this invariably a most reliable sign, and it is for all practical purposes diagnostic. The use of syringes generally has not been satisfactory. The epidemic in Hampshire has assumed very serious proportions, and in the geographical county there have been well over 300 notified cases. I think it extremely probable that this represents a very large number of actual cases, when one allows for the undoubtedly great number of missed mild cases. It has meant a very great demand upon the County Council Bacteriological Laboratory, and arrangements were made early in the epidemic for all contacts to be swabbed, and the swabs examined in the County Council Laboratory. Cerebro-spinal fluid has also been examined for diagnostic purposes in a great number of cases.

DR. OSCAR HOLDEN (Southampton) said:—A post-mortem which I was fortunate enough to assist in at the Isolation Hospital, Southampton, seems to clear up the question asked by Dr. Lyster. On opening the skull there was seen marked injection of the membranes over the vault. Yellowish purulent exudate was thick over the base of the brain, cerebellum pons, medulla and cord. The sphenoidal sinuses were opened and found to be full of muco-pus, from which the diplococci were isolated, and from thence a clear path of infection was traced to the cancellous tissue of the body of the sphenoid, which showed osteomyelitis. From here a burst through was seen into the sella turcica, combined with a periostitis over the area covered by the pons and the pituitary body. It seems reasonable that the sudden unconsciousness which supervened in this case took place soon after the escape of pus into the confined area of the meninges, the previous headache being due to the osteomyelitis and periostitis. The case was fatal within 48 hours of onset of unconsciousness.

DR. HOYLE (Hampshire C.C.) mentioned two cases of apparently direct infection. He remarked on the remissions characteristic of the disease, which add sometimes to the difficulty of diagnosis. He considered that Kernig's sign might be early or late, but was frequently absent. He pointed out the difference between an infected contact and a carrier.

DR. C. W. HUTT, of Brighton, remarked on the several different forms which were sometimes taken by the rash in cerebro-spinal meningitis. In some of the cases shown him by Dr. Forbes the rash consisted of elements very closely resembling a flea-bite, that is to say, a puncture surrounded by a reddened area; on close inspection, however, the apparent puncture was not central in position. Dr. Forbes had shown him an instance of ulceration following a hæmorrhagic rash. It would be interesting to know the mathematical chances of the case being cerebro-spinal fever when a clear fluid was obtained on lumbar puncture. The remarks of prognosis were, in his opinion, one of the most valuable parts of the paper. One of the cases admitted during the outbreak, a child about six years of age, was extremely livid in appearance, comatose, and with marked opisthotonos, but recovery had taken place. During a more or less localised outbreak at Liverpool in about 1907-1908, he saw a child on whom, on the sixty-fifth day of the disease, lumbar puncture was done for the first time and purulent fluid withdrawn; intrathecal injections of Flexner and Joblin's anti-serum were made and recovery took place. At a Mothers' Welcome at Brighton he had seen a child about three years of age who was suspected of being blind. A report obtained from an ophthalmic surgeon indicated that metastatic choroiditis and iritis was present in one eye and iritis in the other.

The history of the illness pointed to the likelihood of epidemic cerebro-spinal meningitis being present not only in this child but also a baby belonging to the same family. Deafness requiring tuition in schools for the deaf was apparently rare in England, only one child out of 874 pupils in the London County Council Schools having acquired deafness from this cause; the corresponding statistics obtained by Mygind varied from 1·1 per cent. in Saxony and 26·8 per cent. in Pomerania. Dr. Hutt had seen a case of mental deficiency in which the condition was said to have been due to cerebro-spinal meningitis.

CORRESPONDENCE.

The Editor does not accept responsibility for the opinions of correspondents.

To the Editor of PUBLIC HEALTH,
3, Rhodesia Avenue,
Halifax,

13th June, 1915.

DEAR SIR.—I read in the June issue of PUBLIC HEALTH a speech delivered by Dr. Robertson, M.O.H., of Leeds, which filled me with amazement and disgust, and I was still more amazed to find that in the discussion which followed no protest was made, and that the President stated: "That Dr. Robertson had dealt with his subject in a fascinating and charming manner."

May I, as a woman, tell you how his tirade against British women struck me?

Dr. Robertson envisaged those Hells on earth, the slums of our large towns, and he could find no one on whom to put the blame of the awful conditions there existing but the women. The "Jezebels," as he calls them, "they are raucous voiced and obscene," and "the cunning women of the underworld." "Time hangs heavily on their hands, and when they try to clean they only make dirt more apparent." The men of the slums, he hastens to tell us, are "more sinned against than sinning." If his obsession were not so sad, it would be laughable. Think of these women living in unhygienic, inconvenient houses (built by men), probably having to toil up and down stairs every time they need a drop of water, and having to boil all the warm water they use, and often no coals to boil it with; they are the slaves and general servants of the whole house. Does Dr. Robertson know anything of the amount of work to be done in a working class household, in which there are two or three children, and all to be done by one pair of hands? Again, these women often produce yearly, or eighteen monthly babies (or mishaps), they have to be about again before they are fit, and so relaxed pelvic ligaments result, with general malaise and a feeling of tiredness that never leaves them. These women have truly been wounded in the battle of life, but for them are no honours, no medals; and no sympathy, but merely the sneers of a male medical officer of health.

The beneficent State does not even give the wife any legal right to her husband's wages, he can give her as little as he chooses, he may spend on "whippet racing dogs, football, and the public-house" what should be spent on the home, and she has no legal redress. Is it any wonder that some women give up such an unequal fight and drown their sorrows in the public-house?

I would ask Dr. Robertson what I sometimes ask myself, given such conditions, would he do as well as the majority of them do? As far as I am concerned, I fear the answer (to borrow a politician's phrase) is in the negative; what his answer would be, I must leave to his own conscience. Then his remedy—Germanize English women. Does he know anything of the position of women in Germany? It is the worst in any civilised nation. Woman is looked down on contemptuously by the men. The Kaiser himself states that women should have no mind above children, kitchens, and churches. I advise Dr. Robertson to read "The Soul of Germany" (Hutchinson), by Dr. Thos. Smith, the result of twelve years of close study of the German people; there we learn that as the result of the father's treatment of the mother, young men learn to treat all women with contempt, that no young woman would dare to walk alone in woods in Germany, for fear of molestation, that there are 180,000 illegitimate births in Germany every year, and 10,000 cases of rape yearly are brought into the German law courts, and all the result of the position of German women.

No, never would English women consent to be Germanized. My remedies for the evil conditions of the slums are as follows:—

1. Let Medical Officers of Health insist on decent, convenient houses being built, having plenty of air space and sunlight, also having hot and cold water laid on, on every storey—the hot water being supplied by the Municipality—so that the work shall be reduced within reasonable limits.
2. Clubs should be formed by the Municipality, where husbands and wives could enjoy their recreation together, as want of recreation often drives to drink, and these clubs should replace the present public houses, and children should be allowed to be brought there.
3. The drink traffic should become a Government monopoly, as it has become in Finland (where women have votes), with the result that Finland was before the war the most temperate country in Europe.
4. The married man should be legally compelled to bring home all his wages; when the home demands have been fully satisfied, the residue should be shared equally between the husband and wife, to be theirs to do what they please with.
5. No woman should have a child oftener than once in three years, and this result should be brought about by continence.

Please excuse the length of the letter, but the urgency of the matter is my excuse.

Yours faithfully,

HELENA G. JONES, M.B., B.S. (Lond.), D.P.H. (Cantab.).

THRIFT IN FOOD SUPPLIES.

By H. MEREDITH RICHARDS, M.D., D.P.H.

Deputy-Chairman National Health Commission (Wales).

THRIFT, it has been said, is the least attractive of the virtues but it is not for that reason, but because of the wide scope of the subject that this paper is limited to the consideration of one only of the many aspects of that unpopular virtue. The adequate discussion of "Thrift" would compel one to survey the whole field of both national and private expenditure. Now, however tempting it might be to criticise the alleged extravagances of one's neighbours or debate the wisdom of local authorities embarking on new public utility works at the present time, it is obvious that we should be concerning ourselves with problems regarding which medical men in their professional capacity have no special claim to be heard.

My object is far less ambitious, namely, to open a discussion on economy in food and the best method of planning an educational campaign in relation thereto that shall be effective as regards both subject matter and the proportion of the population brought within its influence.

Three reasons at least may be advanced for asserting that such a campaign is imperatively necessary. In the first place, many people of straitened means are feeling the pinch of higher prices, and would welcome expert advice on economical dietaries. In the second place, a very large number of people have at the moment an unusually large weekly income, part of which should, if possible, be diverted to the Savings Bank or War Loan, not only as a provision for the rainy days which must follow the end of the war, but as an addition to the national investments wherewith the cost of the war may be met.

The third and last reason for economy in food is the effect on national credit. Thanks to our Navy we are apt to forget that the United Kingdom is not self-supporting, and that, normally, something like £300,000,000 worth of food is derived each year from abroad. In times of peace these and other imports are paid for by exports, by freights, by interest on foreign investments, and so forth. During war it is obvious that this exchange of commodities is fundamentally altered. New imports (in the form of munitions) swell that side of the balance sheet, while exports are diminished by many obvious causes. It is

clear that these changes, if considerable and unchecked, must sooner or later affect the national credit, cause a further rise in prices, and materially hamper the conduct of the war. Without pursuing this further, I think we may agree that under such circumstances careful and well-considered economy is a duty which every patriotic citizen owes to his country, and in particular anyone, whether peer or peasant, who wastes the country's food at such a time, robs us of that which not enriches him, but leaves us poor indeed.

Of course, it is equally plain that the cost of food will also be affected by variations in the total supply available for consumption in this country, and it would be interesting in some other place and at some other time to hear the views of economists on this aspect of the question, but for this occasion I wish to confine the discussion to two main issues, *viz.* :—

- (1) In what ways is it possible to economise in expenditure on food?
- (2) How can information on this subject not only be made generally available, but disseminated in such a form as to affect the habits and customs of the community?

Let us first refer briefly to economical expenditure. Theoretically one would advocate the universal adoption of the balancing chair described in the *Spectator*, which gave the occupant warning as soon as he had consumed the requisite amount of nourishment appropriate to each meal. In practice it is extremely difficult to fix any standard quantities that can be universally or generally applied. When allowances have to be made for age, sex, occupation, exposure to cold, reserve for sudden demands for unusual bodily exertion, and so forth, the problem assumes a complexity which makes it unsuitable for popular exposition. Moreover, one is at once faced by the difficulty which those of us who have had charge of institutions fully appreciate, namely, that fixed quantities per head naturally err in the direction of extravagance in order to meet the needs of the individual whose consumption is for some reason in excess of the average. Scales of consumption, therefore, except when used for occasional purposes of control, do not necessarily make for economy.

Fortunately it is probable that the difficulty may largely be evaded. Food economy among

wage-earners is largely a matter of wise selection of foodstuffs rather than of reduction in total quantity consumed, and among the affluent there is little fear that economy, however earnestly preached, will reduce consumption below the limit of human nature's daily needs. Probably the best plan is to prepare a list of suggested daily menus with a statement of the quantity of raw material needed for a week's consumption by a family of, say, two adults and three children. Those responsible for such a statement can, of course, readily calculate the proteid, fat and carbohydrate content by reference to standard tables and judge of its sufficiency by further reference to an accepted dietary.

The next phase of our subject is the choice of food, and here we have to aim at a selection of a mixture of foodstuffs which must not only satisfy the analytical chemist that it contains a sufficiency of potential energy, but be in such a form as to be palatable, digestible and cheap. Were it not for the complications introduced by the necessity for a mixed diet and the maintenance of nitrogenous equilibrium the problem would resolve itself into a simple calculation of the number of calories that could be purchased for a given sum, but nature has willed otherwise, and it is therefore necessary to consider the question in reference to proteids, fats and carbohydrates.

PROTEIDS OR, AS THEY ARE MORE CONVENIENTLY STYLED IN LEAFLETS FOR POPULAR INSTRUCTION, MEAT AND MEAT SUBSTITUTES.

We are at once brought up against the Board of Trade advice to reduce the demand on the nation's meat supply to the minimum. How can this be done? In the case of affluent households it is generally true that meat is available at too many meals and is eaten in too large quantity; but this is just as certainly not universally true of the working classes. How, it may be asked, is the meat consumption of the latter class to be reduced or, what is equally important, what advice can be given that will enable those near the poverty line to obtain the necessary amount of meat or of meat substitutes at the enhanced prices now current.

Before answering this question it may be convenient to examine the following table which was prepared some years ago with the aid of Dr. Hutchison's and Dr. Niven's writings for a course of popular lectures to parents.

TABLE OF FOODSTUFFS CONTAINING AN APPROXIMATELY EQUAL QUANTITY OF "MEAT" OR MEAT SUBSTITUTES. Prices to nearest penny quoted in cheap shops in a large County Borough.

	1911	1915
	s. d.	s. d.
5lb. joint of foreign beef	2 6	4 2
5lb. meat "pieces"	1 3	2 1
5lbs. ox liver	1 8	2 6
18 herrings	1 0	2 3
3lbs. cheese (Canadian)	1 6	2 9
11lbs. flour	1 7	1 11
7lbs. oatmeal	1 0	1 6
15lbs. bread	1 10	2 8
6lbs. split peas	0 7	1 6
5lbs. lentils	1 0	1 8
8lbs. haricots	1 1	2 0
12 quarts milk	4 0	4 6
12 quarts skim milk	2 0	3 0
61 eggs	5 1	7 6

Several points are worth attention. In the first place the economy of purchasing meat "pieces" is still evident, but herrings no longer occupy so favourable a position as they did four years ago. Whole milk also has advanced some 12½ per cent. in price, but skim milk has increased 50 per cent. Even at this enhanced price skim milk is still a valuable food, provided it is not used for infants, while if cooked in puddings the subtracted fat can readily be restored by the addition of dripping or margarine, though the economy thus effected is not considerable at the current price. It is, however, open to question whether the rise of 50 per cent. in the price of skim milk is justifiable and whether it would not be possible to follow the course, said to be adopted in Germany, of reducing the railway charges for the carriage of skim milk so as to make this valuable commodity available at a much lower price.

The next point on which one would like an authoritative opinion is the extent to which animal derived proteid can be replaced by vegetable proteid. Chemists, it is presumed, would offer no objection to a complete substitution, provided due allowance is made for the non-absorption of a considerable proportion of the proteid present in peas and beans. It is not clear that a physiologist would be equally compliant, but in point of fact certainty is not essential. For many reasons, and especially for reasons of palatability and of digestibility, a mixed diet would be recommended and any possible defect in the constitution of vegetable proteid would be made good by the proportion of animal food that would enter into a mixed diet. We may therefore dismiss from our minds any anxiety as to what effects might conceivably ensue if the nation were suddenly to adopt a rigidly vegetarian diet.

FATS.

Time will not allow nor is it necessary to labour the nutritive value of dripping and of margarine as adjuncts to the more common forms of animal fat. Nor need one repeat well-worn platitudes respecting the usefulness of bread and dripping, dripping pudding and suet pudding as means of enabling children to ingest fat.

CARBOHYDRATES

are usually consumed in sufficient quantity and in economical forms. Stress should, however, be laid on the importance of avoiding that expensive form of quackery which disguises ordinary cheap carbohydrates under fancy names at fancy prices.

The simplest method of bottling fruit which requires little skill and no apparatus also deserves popularising.

An effort might also be made to get manufacturers to put pure glucose on the market in a form and at a price which would allow of its economical use in home-made jams and in other ways as a substitute for sugar.

ALCOHOL.

Whatever views we may hold as to the place of alcohol in the nation's diet in normal times, there can be no two opinions that for the healthy man or woman expenditure on alcohol is money spent on luxury which should be rigidly barred in times of war. In the discussion which may follow it is to be hoped that we shall confine ourselves to this aspect of the question, so that, if possible, both teetotalers and moderate drinkers may form a coalition, while reserving to themselves the right to resume—at the end of the war—divergent views on other aspects of the drink question.

We now come to the second division of my subject.

HOW CAN INFORMATION ON ECONOMY IN FOOD BE WIDELY DISSEMINATED IN AN EFFECTIVE FORM?

Many medical officers of health and school medical officers are and have been doing much valuable work in this direction, both before and since the outbreak of war. Much too, according to the daily press, has been attempted by various voluntary agencies, but owing to lack of organization the effect has not been so great as we or they could desire. It is for that reason that this Society has a unique opportunity of co-ordinating both official

and voluntary efforts and conducting an educational campaign, which shall not only render a national service in the present emergency, but be of supreme importance in the subsequent history of our country.

I suggest that a small committee of this Society should, with the aid of one or more authorities on dietetics, at once issue an authoritative statement of the ways in which economy food may most safely and readily be secured. This statement should be accompanied by suggested menus together with an adequate list of palatable and nutritious dishes selected with due regard to the principles enunciated in the statement, and to the average cooking facilities of a working-class household.

Opportunity would also be afforded for diffusing instruction in methods of cooking that would economise fuel and the labour of the housewife, whereby further considerable saving would ensue. It need hardly be said that in framing suggestions for economy considerations of health and working efficiency must always be paramount and the wisdom of any specific recommendations beyond cavil. It is for this reason that the advocacy of any particular dietary scales, menus or foodstuffs has been avoided in these introductory remarks, as it was felt that this could better be done in the light of the discussion and by a properly qualified committee.

Care also must be taken that any abstract advice is in such a form that it can be clothed to suit local circumstances. Thus, advice as to home-made bread might be superfluous in some districts and impracticable of application in others.

This, however, is only the beginning of the campaign, as I presume not even the youngest of us believes in conversion by pamphlet. The next step must be the preparation of a comprehensive syllabus of a course of two or three demonstration lectures suitable for a popular audience. Those who have tried will agree that if the lectures are given by anyone who knows the subject, and particularly if opportunity is afforded for demonstration and for discussion, success may be assured among a considerable class, and it is precisely by capturing the receptive class that public opinion is moulded and the mass of the population reached.

It is unnecessary to define the qualifications of the lecturers. Whether health visitors, school nurses, cookery instructors, teachers,

voluntary workers, or medical men, they must have made the elements of the subject their own. With regard to audiences many possibilities at once occur to one. First and foremost there are the audiences which can readily be secured in connection with elementary schools, if the co-operation of the teachers is gained. Tuberculosis clinics, mothers' meetings, and girls' clubs are other existing organisations whose assistance can be relied on. Nor should the importance of influencing men as well as women be neglected. Fathers as well as mothers would be attracted to lectures in the schools, and in many localities Approved Societies and their branches would welcome lectures on such a practical aspect of health insurance.

Of course, a campaign of this magnitude is no light matter, but when one considers that if economy to the extent of only one penny per head per week were brought about there would be a saving of upwards of £9,000,000 per annum, it is clear that the end would justify the sustained effort both of this Society and of the local authorities whom they represent.

In conclusion, I would urge the importance of putting the campaign on a truly national basis. In the past official instruction on Thrift has been chiefly directed to those whose incomes automatically excluded superfluities. Now the appeal should be made to all classes and particularly to those who are comparatively well-to-do. Partly because they have larger opportunities for thrift, but also because they tend to set the fashion in the choice of food and exercise a great, if indirect, influence on their less affluent neighbours.

The importance of domestic thrift has not been overlooked in Germany. Only this morning the "Neutral Observer," who has contributed several deeply interesting articles to the "Times," says in respect to women's work in Germany:—

Instruction began in the kitchen. The preserving of fruits, the tinning of vegetables, the scientific preparation of food so as to secure the greatest nutritive value, and similar matters were taught simultaneously in 150 cities in the empire. Communal kitchens were opened in many towns for this work, and the women soon adapted themselves to the new requirements. They responded everywhere with enthusiasm to the appeal, and it would be no exaggeration to say that the present relative abundance of food in Germany is in a great measure due to their efforts.

I, for one, refuse to believe that the women of England will prove less patriotic if the position is properly placed before them.

DISCUSSION.

DR. NIVEN (Manchester) congratulated Dr. Richards for the manner in which he had opened this important question. So important did they feel it in Manchester that they had issued pamphlets precisely on the lines advocated by Dr. Richards, setting out the sort of food which should be used, the amount of proteids, the total calories they contained, giving examples of diets, and generally indicating what should be done in the city. He had no doubt, however, that the form in which these facts were presented could be greatly improved upon; and it was extremely desirable that this Society should issue an authoritative statement as to what foods it was best to use. Of course fish was now much more difficult to obtain than formerly, and cheese had risen considerably in price; so that there was not now that difference in the price of proteids that there was at the beginning of the war. Prices were becoming more uniform. In regard to bones, one might see the same process going on as heretofore. The butchers collected the bones and took them to the bone boilers who were engaged in extracting various materials from these bones, which might with organization be utilised for the production of fats and proteids. The Board of Fisheries in Lancashire made an offer at the beginning of the war to supply them in Manchester with shell-fish, which contain a very large amount of proteid—an offer which, however, could not then be accepted. He mentioned that as indicating that there were resources which were by no means exhausted even in the food supply. Again, we did not quite use existing resources in regard to fats and the manner in which they could be obtained. With regard to tuberculosis, they had a committee in Manchester which administered a sum of money, voted by the City Council, to give assistance to families exposed to infection of tuberculosis, with the view of improving their physique. In order to do that effectually, careful investigation was made as to the resources of the family and the precise mode in which their daily diet was conducted, so that the Committee might know the direction in which they should make their recommendations; what deficiencies existed in the daily diet, for instance, in the lack of vegetables and fruit, because they might use too much carbohydrates to the exclusion of other elements and of necessary salts. In each case they had to decide what assistance should be given in the kind and amount of food which should be granted to the best advantage.

It was found that when they went into oatmeal and food of that kind the people had not enough vegetables. A proper amount of vegetables was necessary, and it was, therefore, really a matter of very careful consideration as to what dietaries were most economical. It was also found that in order to

get the people to use cheaper dietaries, it was absolutely essential that these should be properly cooked. It would be a valuable thing to the community if, in any systematic scheme for the improvement of our national resources, some great effort should be made to organize cooking instruction, which ladies willing to help would be able to give. He strongly supported Dr. Richards' proposal of a Special Committee to draw up special recommendations, which should be sent to the various local authorities in the country. The Local Government Board might take the matter up and give these recommendations the widest publicity, and the medical officers of health might engage in organizing the campaign when started.

THE PRESIDENT said that Dr. Niven's experience was most valuable. Could he tell the meeting what difficulties he had encountered or mistakes that had been made?

DR. NIVEN said that as to mistakes this was scarcely in question, as he had no personal experience in regard to cookery. The educational authorities had to do with instruction in cookery; but it was difficult to say how far their efforts had been utilised.

THE PRESIDENT: Did they employ a trained cook to teach cookery or simply an intelligent woman?

DR. NIVEN said that the prime thing was that the person should have a good knowledge of cookery, and that her services should be utilised systematically. No doubt a trained cook was to be preferred. Valuable experience had been obtained in the School for Mothers.

DR. H. BEALE COLLINS (Kingston) said that the ordinary working people were uncommonly well off at the present time. The wives of soldiers who had joined and gone to the front were getting a great deal more money than when their husbands were at home. They were, therefore, flush of coin, and were not inclined to cut down their food or their drink bill. They were rather, on the contrary, going, as they said, to enjoy themselves. As to what were called well-to-do people, an enormous amount of waste took place in their households. He knew of a family who spent 10/- a week on eggs only—a family of four people—father, mother, and two daughters. The father told him that his household intended to go into economy, and do away with one of the joints they had every day! Hitherto they had had a meat meal three times a day, and now they were going to substitute for the joint at one of the meals, suet dumplings with vegetables and gravy! That was not a rare case. In Kingston they had aviation works, where the men were very highly paid; and on a Saturday night you could see the women-folk buying big joints of meat. When spoken to about it, they said: "Oh! we have plenty of money; why should we not enjoy ourselves?" He thought practical

instruction in economical cookery would be greatly appreciated by a number of persons, who would eventually leaven the whole.

DR. WILLIAM BUTLER (L.C.C.) said that Dr. Richards had introduced a subject that had been the vice of the British people for all time—the character by which King Alfred allowed his cakes to burn! One of the most pressing points at the present day was a reform of our social habits, and not the least of these was the selection and preparation of food. He did not think that it was possible that in the present crisis they could suddenly alter the habits of the people. Education was a very slow process. Some reformers had succeeded in inducing some mothers not to feed their babes on gin and shrimps. Adult feeding, however, had not yet been touched. One would have hoped that something might have been done in that direction by means of elementary education. He had been told by teachers that the aim was not to teach the girls to cook at home, but to prepare them as teachers of cookery. The articles of food which they were instructed how to cook were not those that were available in the houses of the working classes; and it was in these houses that the waste went on, far more than in the houses of the middle classes. One would be astonished at the difference in price of meals here and in France. His experience was that you could find a cheaper and better meal in France, even although France was under a protective tariff. What we had to deal with now was not a systematic education in cookery, but in an emergency like the present they might hope to make some change in the habits of the people by giving them information. The problem divided itself into two—central authorities, such as the Board of Trade, were best suited to get out tables as to the kind and quality of different diets which the medical officers of health or local authorities should distribute to the public.

DR. MEREDITH YOUNG (Cheshire C.C.) said he had taken special interest in the subject of the teaching of cookery and had visited most of the cookery centres in Cheshire. There, the girls were taught how to select cheap foods and their values, and the best methods of cooking them. He hoped that the proposed Committee of the Society when it got to work, would not forget the nutritive value of cheese. The main objection to its use by many people was that it was indigestible; but that was because it was eaten in its crude state. There were, however, many ways of making cheese more digestible. Another very important matter which wanted looking into was the amount of nutritious material that was wasted; for instance, whey, which contained a large amount of milk sugar. As to the preparation of jam, he had suggested to his wife the employment of the ordinary bacteriological

method of preserving fruit. A little cotton-wool, sterilized in a fish kettle, was a most admirable preventative of the formation of mould and the consequent deterioration of the jam.

DR. S. C. LAWRENCE (Edmonton) said that from his experience in Edmonton he would suggest that some of his friends should engage in pig-keeping, for he was told that it was a very profitable occupation, much more than his own. He had thus had his attention, years ago, drawn to the fact of the enormous and appalling waste of food which went on in the restaurants, and Poor-Law institutions in London. He thought that the Government, before attempting to interfere with the private consumer, should begin at home and introduce economy in these Poor-Law institutions. He had seen cartloads of good food coming down from them day after day to fatten Edmonton pigs. Whether they could prevent the enormous waste that goes on in the London restaurants he could not say. Since Edmonton had developed as a London suburb, it had never been as prosperous as now; and the soldiers' wives were having the time of their lives. One could hear many a housewife say: "I don't care how long my Bill is away. He may be away for five years, for me and the kids were never so well off as now." At present, in his neighbourhood, any man who was willing to work, could get it at enhanced wages.

DR. BARWISE (Derbyshire County Council) said that the real reason for the necessity of this campaign was that we were living on our capital. He was sure that if the matter were put before the working people of the country in a proper light, they had as much patriotism as any other class, and would follow good advice. They knew that unless they put something by now for the time when wages must fall, evil days would come. That was part of the game by which to beat the Germans, because success in the war would go to the longest stayer. In some respects, the Germans had an advantage over us by stricter discipline and making use of foods neglected in this country. He had never understood why horse-flesh should not be here consumed as on the Continent, and he thought the public should be educated up to that point. There were thousands of educated women in this country who were perfectly competent cooks, and who were saying that they wished they could do something for the war. The services of a large number of middle-aged ladies who were now lamenting that they could not do anything to help the country could be enlisted in this direction, and he was quite certain that the matter needed only to be put before them, and they would adopt it.

MR. WHITAKER, F.R.S., said it was quite right for Dr. Richards to speak of carbo-hydrates at a meeting like the present, but what did ordinary

people understand about carbo-hydrates? They would think that they were some sort of medicine, and that proteids was some sort of unappetizing concoction. He thought they should not run down indiscriminately the fashions of our own country which some people were always doing, even in the matter of English cookery. Our people could not be converted to adopt French or German cookery; but something more might be done to improve English cookery. Undoubtedly, a great deal of wicked waste took place with our food, and if that could be remedied a vast improvement in the feeding arrangements in this country would follow. But, if they were to enter into a propaganda on this subject, they must address the people in the people's language.

DR. GIBBON said that at the present time out of every 20/- of national income we were spending at the rate of about 8/- on the war, whereas usually we only saved about 3/-. Therefore, there was urgent need for economy. But he suggested that the economy should be effected on a very broad basis. Any run on particular articles only tended to put up the price, as had happened in Germany. Teaching cookery *in vacuo* or under ideal conditions had little effect on the habits of the working people. A better method was that employed by the "Pudding Lady" who went into the people's homes and taught them how to cook with the materials at hand, and make use of the utensils she found there. In Germany there was a wonderful spirit of organization among the people which was not approached here—not simply Government compulsory organization, but voluntary organization—among other matters, with regard to the food supply; and it was remarkable what they had done there in that respect. Another thing in Germany was the way they made use of experts in all directions. He agreed with Dr. Richards as to the necessity of getting an authoritative statement as to the methods of food economy by a body of experts in whom the public could have some faith. If effective work were to be done, it should be done through local organizations which were in touch with local conditions.

DR. CROWLEY referred to the action being taken by the Board of Education with special reference to a food pamphlet which, at the request of the Board of Trade, they were about to publish containing directions for the preparation of simple and nourishing meals in the home. The difficulty was emphasized of drawing up such a pamphlet to meet the requirements of the various classes of the community. Technical terms had been avoided and as little padding used as possible. The pamphlet drew attention to the foods available as substitutes for meat, and showed how these could be used in conjunction with meat, thus effecting a saving in the quantity of

meat used, or formed into dishes without the use of meat. Recipes were given for a series of fifteen one-course dinners, followed by an indication as to how these might, with slight modification and addition, be arranged as two-course dinners. Following these were certain additional recipes for simple dishes prepared in the main without the use of meat. Dr. Crowley intimated that it was intended to distribute the pamphlet widely through the medium of local education authorities, who, it was hoped, would work in conjunction with or through suitable local voluntary agencies. Grants in aid would be available for instruction given, through practical demonstrations, in the purchase, preparation and cooking of nourishing foods. In this connection the Board would greatly value any assistance which medical officers of health might be able to give in respect of the furtherance of the objects, use and distribution of the proposed pamphlet. Referring to other educational steps taken in regard to the right choice and preparation of food. Dr. Crowley expressed the opinion that Dr. Butler's criticism of the teaching of cookery in schools required some modification. From what the speaker had seen of this work at certain of the London cookery centres he thought that particularly practical work was being done, and an endeavour made, under difficult circumstances, to make the instruction fit in with the requirements of the home. He was glad to hear in this connection of the high opinion Dr. Meredith Young had formed as to the practical value of the teaching of cookery in the schools of Cheshire.

DR. MACFADDEN (Local Government Board) said that this excellent paper, and the interesting and useful discussion upon it, had, he thought, amply justified the President's action in calling this special meeting. The discussion had brought out many of the points which would need to be dealt with, but he would confine his remarks to the importance of the part which could and should be played by medical officers of health in instituting and directing local efforts to secure economy in the consumption of food materials. Everybody was agreed that economy was necessary. People from abroad who lived in this country for any length of time were invariably struck by the enormous waste of food which occurred in British households of all classes compared with those of continental nations. The occurrence of this waste might partly be accounted for by the fact that speaking generally British people did not take kindly to soups and broths, which were very important waste-preventing dishes. A number of societies had interested themselves in the question of household economy, cooking, etc., and these, together with similar more recently-formed

societies, were doing good work in this direction, and were probably capable of doing a great deal more. Medical officers of health could help enormously to popularise work of this kind in their districts. They knew the local food habits and customs of their people, which varied greatly in different parts of the country. Any pamphlet dealing with a general scheme of food economy would be sure to need some local modification in order to make it of real practical value in the various districts. The medical officer of health could supply this. With his help, advantage might be taken of the general interest which was now being aroused in this subject to fan it into enthusiasm and create an atmosphere in which the study and practice of economical living might become the fashion. They had seen something of the sort very successfully accomplished in connection with the courses of instruction in first aid and nursing given by the St. John Ambulance Association and the Red Cross Society. The mass of the people were keen to do something at these times. Great numbers of them took these courses and classes because they thought it might make them more useful to their country. Could not a similar movement now be fostered in connection with the problem of food economy? When the people understood, as they were coming to understand, the importance to the country of a working knowledge on the part of every housekeeper of how to save on food, they would be equally keen to take this matter up. He was sure that this Society and its individual members could help enormously to make the most of this opportunity by encouraging the formation of local classes of instruction on war-time food economy and the work among their people of societies of the kind to which he had referred.

DR. HOWARTH (City of London) joined in the approval of Dr. Richards' paper, the keynote of which was economy, not on the ground of shortness of food, but on account of high prices. He was in doubt whether, so long as wages were high and food could be purchased, it would not be purchased in usual amounts, and so help to maintain the present high prices which prevailed. He expressed doubts as to the value of rapid education by ordinary methods, but he was a great believer in the power of the Press, especially when associated with a direct message in favour of the worthy object. The message was, "Eat less, waste less," and if this was sufficiently reiterated a vast public could be touched at the present moment on account of the high patriotic sentiment which prevailed. He hoped the proposed Committee would undertake as far as possible this journalistic function as one of the means of informing the public.

THE PRESIDENT said as to the suggestion that

a Committee should be formed, he would point out that there were difficulties in regard to it. In the first place, every medical officer of health was fully engaged just now and could with difficulty attend meetings. That possibly might be got over by correspondence by post. In the second place, the cost of meetings of the Society was not small, and that would have to be got over. He had no proposal before him that any Committee should be formed.

DR. HOWARTH moved that a small Committee of the Society should be appointed, to consist of members of the Society, together with one or more authorities on dietetics and cookery, and to include a journalist for the purpose of disseminating to the Press any decisions that might be arrived at.

THE PRESIDENT: Would your suggestion be that the Committee should be a postal one, and that a message should be given by the Society through the Press?

DR. HOWARTH assented.

DR. W. A. BOND (Holborn) seconded Dr. Howarth's motion. They ought, he said, to appeal specially to the patriotism of the people.

DR. CHARLES SANDERS (Hon. Treasurer): Can this meeting appoint a Committee?

THE PRESIDENT: Yes.

DR. SANDERS said that with all due respect to the Chair, he doubted it. If Dr. Howarth would refer this discussion to the Council he would support it.

DR. HOWARTH said that if his motion was out of order he would agree to it being referred to the Council as a recommendation from the Society.

THE PRESIDENT: The difficulty of referring it to the Council is that the next meeting of the Council does not take place till the third week of September.

DR. SANDERS thought that the discussion had been most valuable. They had heard views from members of all walks in their profession, and all the speakers were agreed on the main point. Dr. Crowley, Dr. MacFadden and Dr. Gibbon, on behalf of the Education Board, were agreed that the central authorities were the persons who should advise, and that local bodies should disseminate the information which the central bodies gathered. They must get an authoritative statement by experts in whom the public had confidence. Next week they would have a statement issued by the Board of Education, and he did not see why this meeting or their Society should cut the ground from the Board of Education. They should wait and see whether that authoritative statement did not answer all purposes. He agreed as to the value of the Press; but how could they approach all the editors and ask them to utilise each in his own district the recommendations of many voluntary associations? His suggestion was that if this

discussion were printed in their own paper, *PUBLIC HEALTH*, and a special appeal were made that each medical officer of health should organize its distribution, that would be sufficient. He saw a difficulty in appointing a special Committee by this meeting, and especially a postal committee. In his own district in West Ham, most valuable information was given for children in regard to cookery and dietaries.

DR. C. W. HUTT (Brighton) said that if they wanted knowledge disseminated in this country they must use the Press. Everybody read the daily papers and the local weekly paper, and unless they got their views disseminated by means of the Press they would be losing a valuable opportunity.

DR. SANDERS said that printing the discussion in their own journal was one means of getting it into the Press. There was no reason why medical officers of health should not get the authorities in their districts to purchase their journal and distribute it. What was wanted was good local organization.

THE PRESIDENT said that what Dr. Hutt wanted was that a small Committee should bring influence to bear on editors to insert articles in their papers. He must rule that that it be referred to the Council at their special meeting in September.

DR. H. B. COLLINS supported the suggestion that the number of their journal containing the discussion should be sent round to the general and medical press.

DR. HUTT moved as an amendment to the President's ruling that the question of appointing a Committee for considering the suggestions made in Dr. Richards' paper should be referred to a special meeting of the Council to be held next week.

DR. NAYLOR BARLOW (Hon. Secretary) said he did not see what advantage was to be gained by such a motion, and formally opposed it.

DR. HUTT's amendment was then put to the meeting and declared to be lost on a show of hands.

It was then resolved that the motion of Dr. Howarth be referred to the next ordinary meeting of the Council in September.

DR. SANDERS' motion was then put to the meeting and carried as follows:—

"That the Editor be asked to publish in the July issue of *PUBLIC HEALTH* Dr. Meredith Richards' paper on "Thrift in Food Supplies," together with a full report of the subsequent discussion, and that the Editor also be asked to call the attention of medical officers of health to the matter, and to urge upon them, on behalf of the Society, the desirability of directing the attention of their

authorities to the matter, with a view to utilising all the local voluntary associations for the purpose of carrying out the objects of the meeting."

On the motion of DR. MEREDITH YOUNG a vote of thanks was accorded to Dr. Richards for his paper, and that gentleman having briefly replied, the proceedings terminated.

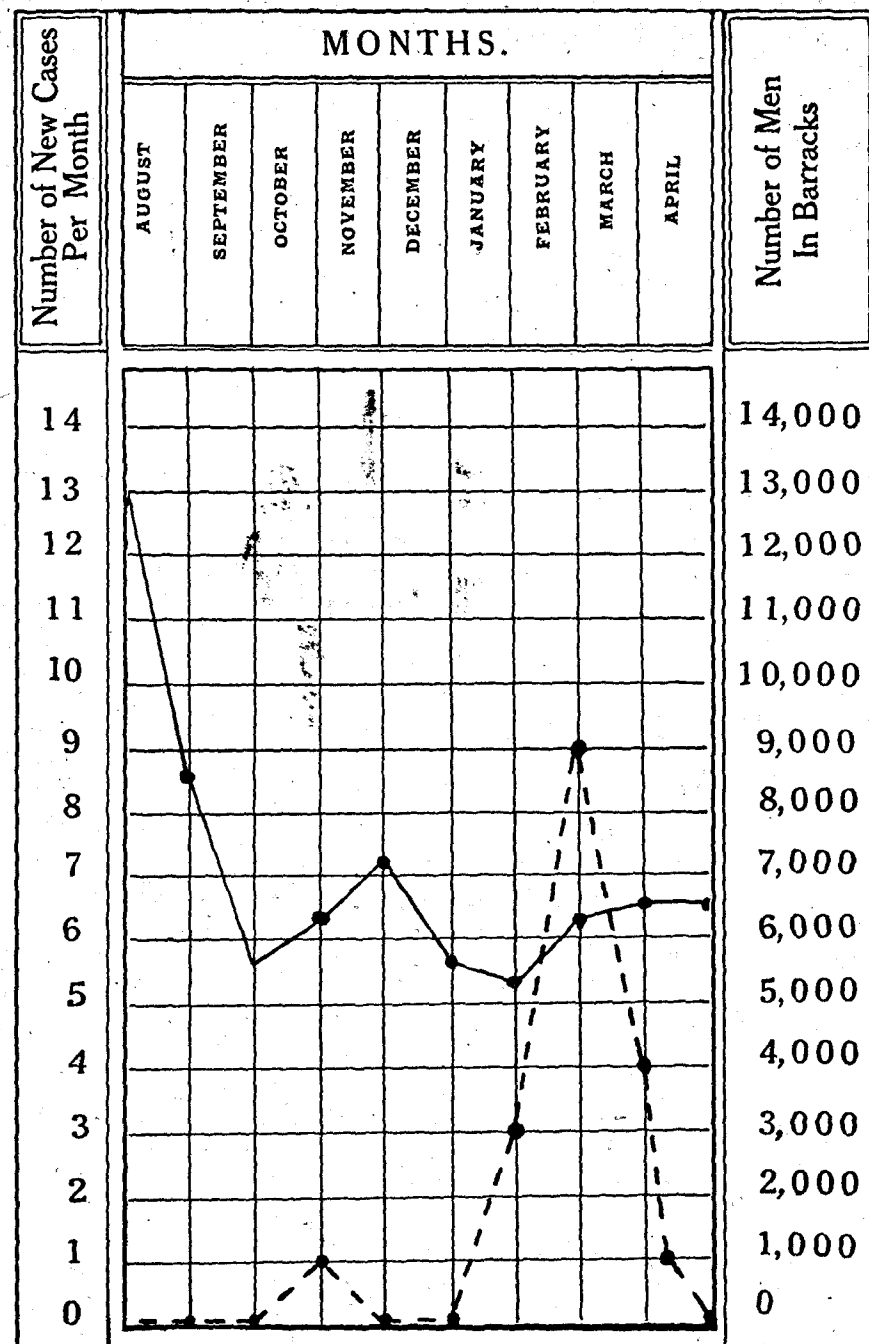
REVIEW.

TEXT-BOOK OF PUBLIC HEALTH. By E. W. Hope, M.D., D.Sc., Professor of Hygiene, University of Liverpool, etc. Eighth edition. Revised and enlarged. Pp. 267. Illustrated. Price 5s. net. Messrs. E. & S. Livingstone, Edinburgh, 1915.

The readers of *PUBLIC HEALTH* will require nothing more than a notice of the fact that the eighth edition (revised and enlarged) of the "Text-book of Public Health," by Dr. Hope, has recently been published. The book is already well-known as one in which a surprisingly large amount of information is compassed within 267 pages of print, and even within this small compass room is found for chapters upon School Hygiene and Military and Marine Hygiene. It is, indeed, a great achievement to have set forth so much valuable information without any sacrifice of clearness and accuracy of statement.

SEASONAL DISTRIBUTION OF INFECTIOUS DISEASES, ENGLAND AND WALES, 1914.

IN the current number we publish curves based upon the figures contained in Dr. Newsholme's return to the Local Government Board, showing the number of cases of the several infectious diseases notified in England and Wales during 1914. The actual number of cases of scarlet fever, diphtheria, and enteric fever was greater in 1914 than 1913; acute poliomyelitis was less prevalent in 1914 than in the former year; while the number of cases of cerebro-spinal fever remained constant. If the two sets of diagrams are compared, it must be borne in mind that in the 1914 diagram the perpendicular scale is less than that of the 1913 diagram, hence the autumnal increase of scarlet fever, diphtheria, and enteric fever is less conspicuous, and the August depression of scarlet fever and diphtheria is less manifest than would have been seen if the scale had been the same as in 1913. The autumnal increase of acute poliomyelitis is again exhibited, and is in contrast with the absence of autumnal increase in the case of cerebro-spinal fever.



N.B.—Dotted line shows number of fresh cases per month, straight line average number vactualled; although at the beginning of August there were about 13,000, the average per day for the month was only 8,318.

SOME NOTES ON EPIDEMIC CEREBRO-SPINAL MENINGITIS.

By SURGEON A. G. L. READE, R.N.V.R.
(Public Health Department, London County Council),
Royal Naval Barracks, Chatham.

IN view of the recent prevalence of this disease throughout the country, and the high mortality of the cases occurring among our Naval and Military Forces, it might seem useful to record a sequence of cases, which occurred at the Royal Naval Barracks, Chatham.

The subject is dealt with chiefly from the standpoint of clinical diagnosis and prevention. The seasonal prevalence, the ratings affected, and

the average age of patients is shown, together with the influence of overcrowding and other conditions on the incidence of the disease. A short history of each case is given, with the predominating symptoms, but only the onset of the illness is described, as all the patients were sent to the Royal Naval Hospital for treatment.

During August, 1914, there were 14,000 men in these barracks, built to accommodate 4,656 in time of peace. The number gradually diminished, and at the time of greatest incidence of the disease there were about 7,000. This fact points to seasonal prevalence as an important factor, which is further illustrated by the accompanying chart.

As regards the ratings affected, there were five engine room artificers, three able seamen, two able seamen (R.N.V.R.), two officer's stewards, two stokers (2nd class), one cooper's crew, one boy servant, one cook's mate, one stoker (pensioner), one writer (3rd class). The ages varied from 17 to 43; the average was 25. The most striking feature was the way in which new entries were conspicuously picked out. Eleven of the cases had been in the service about 12 days. This seems to show that in the presence of a carrier any persons whose resistance is lowered for any reason are likely to develop the disease. Thus one finds among the new entries men who are strange to naval routine, are not accustomed to drill, who probably, in the case of the younger men, feel homesick, and whose general resistance is further lowered by any means. Two men—namely, E. H. and J. M.—had recently returned from hospital after scarlet fever, which would account for lowered vitality.

As regards overcrowding, this naturally affected the atmosphere more in the winter than in the summer. In the summer months many men sleep out and windows are kept open more constantly, while in winter all men have to sleep in and there is a tendency to keep the windows closed. This factor will be referred to again in dealing with preventive measures.

Symptoms.—In nearly all cases the onset was sudden and severe. In the majority there was persistent vomiting, generally accompanied by severe headache and frequently by pain in the neck and back. Some rapidly became unconscious or remained in a semi-comatose condition, resenting any interference. The milder cases showed catarrhal symptoms, and in one case the most prominent symptom was pain in limbs and joints, simulating acute rheumatism.

Signs.—The pulse was rapid and remarkably feeble and soft. Indeed the pulse was so characteristic that it was frequently a valuable aid in diagnosis.

The temperature was raised and varied from 100° to 105°. The deep reflexes were increased and Kernig's sign was well marked after the initial stage.

In nearly all cases there was a rash, varying from a few scattered petechial spots to a widespread purpuric eruption; in one case the rash was so marked and confluent that at a distance the patient appeared to be cyanosed.

The severe cases rapidly proved fatal, some dying within a few hours. The average

duration of ten fatal cases was three days, but one lived for 31 days, and one died in 12 hours. Of the cases remaining in hospital at the time of writing, one has been there for 120 days. In those who recovered the average duration of the disease was 63 days.

The following measures were adopted to prevent the spread of the disease:—

1. **Increased Sleeping Accommodation.**—This was regarded as a matter of first importance. It was found that under the stress of war the cubic air space per man was greatly reduced, sometimes to 211 cubic feet. The men were therefore thinned out by sleeping them in tents, drill shed, gymnasium, bowling alley, gunnery school, etc., so that each man had 500 cubic feet.

The ventilation was improved and supervised by frequent visits by a medical officer and a patrol of sick berth attendants during the night.

2. **Disinfection.**—When a case occurred in a room the room was closed for two days if possible. On the first day all windows, ventilators, fireplaces, etc., were sealed, and formaldehyde vapour was generated in the room for twelve hours from potassium permanganate brickettes and formalin. The room was then opened and fires lighted and the room washed down with Izal solution. Meanwhile bags and hammocks were put through the Washington-Lyons disinfectant.

3. **Isolation of Contacts.**—All immediate contacts were sent to hospital for bacteriological examination and isolation. In addition, all men in the room were examined. Thus, in the case of the engine room artificers, about 130 men were examined, and any with catarrh of the nose or throat were also sent for bacteriological examination. There were 30 such, of whom three were found to be carriers. After these men were isolated no further cases occurred among the engine room artificers.

Two interesting contact cases may be specially mentioned. One was the man F. (A. 7). He was sent to hospital on March 12th as a contact of W. F. (C. 5), found to be a carrier and detained. On March 17th he developed the disease and died on March 19th. Both men were from the "Egmont." The second case is that of B., who joined the "Egmont" from H.M.S. "Mars" on February 21st. On the 22nd he went on leave to his home at Pontefract, returning on the 26th. On March 1st his wife became ill, and later his mother-in-law, both with cerebro-spinal meningitis. On March 6th B. went on leave to see his wife,

and reported the illness on his return to barracks on the 17th. He was immediately sent to hospital for examination and found to be a carrier.

4. *Special Care of Delicate New Entries.*—All new entries, boy seamen and boy servants and stokers, were examined daily, and any looking ill, anæmic, or suffering from nasal discharge or pharyngitis were isolated in a special mess in a room by themselves. These ratings were relieved from all duties and instructions. They were marched out every day when weather permitted, and examined twice daily by a medical officer. Any minor ailments were treated.

To guard against infection being carried to the Fleet, all men on draft were isolated for ten days, during which time their noses were sprayed with solutions of hydrogen peroxide (10 vols.), and argentide 10 grs. to the ounce.

Appended are notes of the cases, arranged in three groups, according to three more or less typical modes of onset.

A.—WITH CEREBRAL SYMPTOMS.

1. A. M., aet 18, cooper's crew, joined the barracks December 11th. On January 10th taken suddenly ill with vomiting and rapidly became unconscious. He was sent to hospital the same day and remained there at the time of writing.

2. E. H., aet 17, boy servant, joined the service October 13th. On October 26th, he was sent to hospital with scarlet fever, and rejoined barracks December 22nd, after 10 days' leave. On January 15th, he came to the sick bay complaining of "pains all over." His intellect was clear; he was very anæmic. He complained of pain in the back of the neck; there was no rash. He suddenly vomited and relapsed into semi-consciousness, passing urine and fæces under him. He became worse in hospital, and died January 20th.

3. J. M., aet 22, A.B., R.N.V.R., came out of hospital January 11th, after scarlet fever. January 20th, he visited the Crystal Palace where several cases of this disease occurred. He said he vomited continually when on leave; rejoined barracks January 26th. On February 7th, he complained of vomiting and pains in joints and back. He was pale and drowsy. Temperature, 104°; pulse, 140; knee-jerks increased; Kernig's sign present; petechial spots on chest and abdomen. He was sent to hospital, and became worse, and died 4.10 a.m. next morning.

4. F. A. S., aet 31, A.B., R.N.V.R., came to sick quarters February 9th, complaining of sore throat and vomiting for four days previous, and severe occipital and frontal headache. At 2 p.m. he vomited several times; temperature, 105°; a few purpuric spots on chest and abdomen; sent to hospital, where he became worse; temperature fell to 97° and he was covered with a thick rash; he was dyspnoëic, and hands and feet became cyanosed. He died next day.

5. A. D., aet 20, officer's steward, February 10th, complained of headache and dizziness and vomiting; temperature normal; pulse, 108; very pale and some petechial spots, and hyperæsthesia of skin. Was discharged to duty on April 19th.

6. S. H., A.B., aet 24, was found sick in his hammock and brought to sick quarters February 17th. He was delirious and extremely irritable; knee-jerks exaggerated, pulse rapid, soft and easily compressed. He was sent to hospital and died in a few hours.

7. S. G. F., aet 34, A.B., R.F.R., was sent to hospital March 12th for bacteriological examination because he had been in contact with W. F., and found to be a carrier, though feeling quite well, and was detained in hospital. He developed the disease five days later and died in two days.

8. J. A., aet 40, E.R.A., came to sick quarters March 18th, complaining of severe headache and giddiness. He said the same symptoms came on the day before, but passed off. He had not vomited, there was no rash, temperature normal, knee-jerks slightly increased. He was sent to hospital, and died March 22nd.

B.—WITH CATARRHAL SYMPTOMS.

1. W. L., aet 22, E.R.A., was placed on sick list February 1st, with general malaise and nasal catarrh; no rash, temperature 102°; sent to Royal Sailors' Home Hospital, where he developed meningeal symptoms and was transferred to the Royal Naval Hospital; confirmed as a positive case March 15th, and died April 15th.

2. G. F. T., aet 42, officer's steward. On February 16th, he said he had felt ill all the previous night; complained of dry mouth, sore throat, and stiffness of the neck. He had retched but had not vomited. Temperature, 102°; pulse, 120; numerous petechial spots on abdomen and legs. This case recovered and returned to duty on May 7th.

3. J. D., aet 27, E.R.A., complained of sore throat, February 22nd, and was put under treatment. On February 24th, his temperature rose to 102.2°, and he complained of pains in the limbs; there was no rash and no other physical signs. He was sent to the Welcome Hospital and then to the Royal Naval Hospital, where the diagnosis of cerebro-spinal meningitis was confirmed. He died on May 19th.

4. R. C., aet 25, E.R.A., came to sick quarters March 11th, with a history of recent nasal catarrh. Symptoms were vomiting, pains in the limbs, head and neck. There was some rigidity, reflexes were increased, and there were petechial spots on body and limbs. He died March 17th.

5. A. W. B., aet 18, writer, on April 5th complained of headache and general malaise; he had not felt well the previous day; no vomiting. Temperature, 102.6°; throat inflamed. Died April 11th.

6. S. G. P., aet 20, stoker. At routine inspection, May 1st, complained of headache and general malaise, sore throat and some cough. Fauces a little injected, no signs in chest, no rash. Still in hospital.

C.—WITH PAINS IN JOINTS.

1. G. E. F., aet 21, stoker, joined barracks September 21st. On October 31st, taken ill. The outstanding symptom was stiffness of the jaw. He was diagnosed as cerebro-spinal meningitis, remained in hospital until January 23rd, when he was invalided out of the service.

2. L. O. W., aet 18, cook's mate. Joined the service January 16th, and on 29th complained of pains all over and vomiting. Temperature, 100.4°, rose to 104° by evening; pulse rapid and of poor volume. Kernig's sign present; some petechial spots on abdomen, arms, buttocks and thighs. He became delirious and died February 2nd.

3. E. S., aet 43, stoker pensioner. February 10th, complained of stiffness of neck and extreme irritability. He had recently been in hospital with bruised cervical muscles. He had some papules on the body. A lumbar puncture was positive, but his condition was never serious.

4. J. B., aet 33, E.R.A., joined barracks February 9th. On February 24th, complained of general pains; had not vomited. Temperature, 102°; no rash; fauces injected, but clean. He was sent to the Sailors' Home Hospital, where he developed the disease, and was transferred to the Royal Naval Hospital. Died February 27th.

5. W. F., A.B., R.F.R., suddenly seized with shivering and severe pain in knees and shoulders on May 11th. This patient's parents had recently died suddenly. He did not know the cause. His wife was also ill. He was sent to hospital as a case of rheumatism and was afterwards confirmed as cerebro-spinal meningitis.

All these cases were diagnosed on bacteriological examination of fluid from spinal canal showing diplococcus intracellulosis meningitidis of Weischelbaum.

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856.

RECONSTRUCTED 1888.

INCORPORATED 1892.

SPECIAL MEETING.

A special meeting of the Society was held in the Society's Rooms at 1, Upper Montague Street, Russell Square, London, W.C., on Friday, June 25th, at 5 p.m. Dr. Herbert Jones, D.P.H., President, occupied the chair. *Present*:—Drs. C. Sanders, W. J. Howarth, B. C. Stevens, Meredith Young, J. Niven, D. C. Kirkhope, J. M. Martin, W. H. Symons, S. Barwise, P. H. Stirk, A. W. J. MacFadden, A. G. R. Cameron, T. W. N. Barlow, S. C. Lawrence, J. T. C. Nash, Wm. Butler, W. A. Bond, J. J. Paterson, H. B. Collins, Frank Robinson, J. B. Howell, S. Davies, A. Stalker, C. W. Hutt, C. J. Thomas, and Mr. Whitaker. Visitors, Drs. R. H. Crowley and I. E. Gibbon.

The Resolution convening the meeting having been read by the Hon. Secretary, Dr. Naylor Barlow,

THE PRESIDENT said that before calling on Dr. Meredith Richards to open the discussion he ought to give the reason which led him to make use of the privilege of the President to call a special meeting of the Society. No one was more conscious than he was of the enormous amount of self-sacrificing work being done by medical officers of health all over the country, not only by those wearing His Majesty's uniform, but by many others. But it appeared to him and to many members that something should be done collectively, and that the organization of the Society ought to be used in directions where special experience might do good in the public interest generally. It was quite possible, and he was prepared to find, that a majority of those present might not agree with him—that they thought they had quite enough to do in performing their individual work, without adding to it collectively as a Society. If that view were taken he would not complain, but he

himself considered that the Society ought to do some collective work. The question of economy in food supply—what he would call thrift in food supply—seemed to him to be a very pressing one, and when he had come to the conclusion that they ought to have some discussion on it as a Society, he had to look about for someone to open it. Dr. Meredith Richards happened to come across his path, and he made no apology for asking him to open the discussion.

DR. NAYLOR BARLOW read a number of letters regretting inability to attend the meeting.

DR. MEREDITH RICHARDS, after stating that it was with considerable diffidence he had consented to open the discussion, though it was a great pleasure to be with the Society that afternoon, proceeded to read a paper on "Thrift in Food Supplies."*

PROVINCIAL MEETING.

THE PROVINCIAL MEETING of the Society was held in St. Peter's Church Hall, Hereford, on Saturday, June 5th, 1915, at 11 a.m. The following were present:—The President, Dr. Herbert Jones, Drs. J. B. Wilkinson, D. Dryburgh Gold, W. Angus, J. L. Livingston, J. Cates, J. W. Miller, W. M. Clendinnen, A. E. Brindley, E. H. Snell, T. R. Bailey, T. Orr, T. W. N. Barlow, T. Evans, J. Wheatley, J. Robertson, W. H. Symons, M. Gepp, Mabyn Read. Visitors: The Hon. and Very Rev. the Dean of Hereford, Mrs. Herbert Jones, Miss E. M. Jones, Col. and Miss Wood Mrs. K. F. Wilkinson, Canon Bannister, Mrs. Snell, Mrs. Ridley Bailey, Lieut. A. G. R. Ledger, Lieut. J. A. Cooke, Lieut. W. F. Lloyd, Mrs. M. Livingston, Mr. R. I. Prideaux, Mr. W. G. Banks, Mr. R. Moore.

The Minutes of the last Provincial Meeting, held in Glasgow, on Saturday, May 30th, 1914 (see PUBLIC HEALTH, July, 1914), were taken as read, approved and signed as a correct record. The Hon. Sec. read letters of apology for non-attendance from Drs. Fosbrooke, Hitchon and Brownlee.

ELECTION.—The following candidate for election as a Fellow, and who had been duly nominated and seconded, was by ballot elected unanimously, viz.:—Dr. Charles William Gee, L.R.C.P. and S., Edin., D.P.H., Town Hall, St. Helens.

NOMINATIONS.—The Hon. Sec. read a list of nominations for election as Fellows.

A discussion then took place on Milk-borne Diseases, which was opened by Dr. J. B. Wilkinson (Oldham) and Dr. T. W. N. Barlow (Wallasey). The former described with charts

* Printed in the present number.

an outbreak of scarlet fever which was proved to be due to milk.

DR. BARLOW read an account of an outbreak of typhoid fever which was due to infected milk, the infection in this instance being directly from the milk-seller, who at the time was suffering from an illness, called at first by his medical attendant pneumonia, but afterwards notified, along with his wife, as suffering from typhoid.

These papers led to an interesting discussion, in which Drs. Orr, Brindley, Cates, Gould, Miller, Snell, Ridley Bailey, T. Evans and the President took part.

After the meeting the members and their friends were entertained to luncheon by the President and Mrs. Jones. Amongst those present in addition to the members were the Dean of Hereford, Canon Bannister, Colonel Wood, and Mr. W. G. Banks, while the following wrote expressing their regret at being unable to be present: The Lord Lieutenant of the County, the Lord Bishop of Hereford and Mrs. Perceval, the Mayor of Hereford, the Chairman of the Herefordshire County Council, Mr. Hewins, M.P., Mr. George Cresswell and Mr. H. J. Bailey. After the usual loyal toasts had been honoured, the Dean of Hereford proposed the toast of "The Society of Medical Officers of Health." The Dean expressed his great admiration for the work done by medical officers of health and the medical profession generally, and alluded with satisfaction to the fact that something like 300 men belonging to that Society were giving their services in connection with the present terrible war. He spoke eulogistically of the work done by English medical men in France, of which he knew something, his daughter having returned from hospital work near Dieppe only a short time ago. The Dean congratulated Lieut.-Colonel Jones on having attained such an honourable position amongst medical officers of health, and assured him that they in Hereford were proud that he had been selected for the presidency, and of the honour done to the city through him.

THE PRESIDENT, in reply, spoke of the urgent need there was for further medical men, and urged that although much had been done more could still be done by medical officers of health, especially in the direction of the work he was now himself doing. He was strongly of opinion that the work of school medical officers and tuberculosis officers must, for the present, go by the board, and there was at the present time a fair number of school medical officers of health and tuberculosis officers of military age who might very well give up their work and do the work of the army. In normal times no one could feel more strongly than he did that the medical inspection of school children was of the first

importance, and that the work of the tuberculosis officer was of equal importance; but these were not normal times; they were very abnormal times, and every man had to consider where in the whole country he could put the talents he possessed to the best advantage of the country. The great business of the country was to win this war.

CANON BANNISTER, in proposing the toast of "The Forces," referred to the complaints which had been made as to the behaviour of soldiers in towns, and said that he had had ample opportunity of judging of the behaviour of the soldiers in Hereford, and far from having any complaint to make they had been a help and a blessing to the town. This toast was replied to by Lieut. Cooke.

DR. RIDLEY BAILEY proposed the toast of "The Public Health Authorities," which was replied to by Mr. W. G. Banks, the chairman of the Hereford Rural Council.

After lunch motor cars were in readiness, and conveyed the visitors in the first place to the Hereford Garden City, round which they were shown by Dr. Miller, then to view the Abbey Dore Church, now in process of restoration. This church is built on the site of a monastery dating from about the year 1100, and has apparently been allowed to fall into a state of absolute ruin—in fact, the nave no longer exists. The choir and choir transepts have, however, been completely restored, and are very beautiful. Another motor run brought the party to Ruckhall, on the banks of the River Wye, where tea was served.

Although, owing to the war, many members being away on military duty, the attendance was smaller than usual at a provincial meeting, the visit paid to Hereford was a most enjoyable one, and those present warmly expressed their thanks to the President and Mrs. Jones for their hospitality and for the completeness of the arrangements made for their comfort.

Yorkshire Branch.—A meeting was held at the Mansion House, Doncaster, on Friday, the 7th May, 1915. The members present included the following:—Dr. Gibson, of Wakefield, the President (occupying the chair), Drs. D. L. Anderson, G. E. Atkins, F. J. Burman, W. A. Bullough, T. A. Caley, R. F. Castle, A. M. Erskine, T. O. Halliwell, J. A. Hargreaves, J. J. Huey, W. D. Jefferson, H. Mason, H. G. Moore, G. H. Pearce, A. P. Percival, H. G. Smith, J. A. Sutherland, Mary Thompson, C. Wills, and J. R. Kaye (hon. sec.).

Arrangements had been made by Lieut.-Col. J. R. Kaye for a visit to the military camps at Doncaster for the purpose of a demonstration on camp hygiene. In view of the interesting nature of the programme the members of the Doncaster

Corporation and officials were also invited, and some 30 availed themselves of the opportunity.

On arriving at the Mansion House, the party was welcomed by the Mayor of Doncaster (Mr. S. Balmforth), who gave a short address of welcome. Dr. Kaye then explained in a short lecture the principles of camp sanitation, distributing various leaflets which he had prepared on military hygiene, and the party proceeded by special tramcar to the cricket field and town moor for an inspection, by permission of General Sir Herbert Trotter, of the military camps there. An instructive demonstration by Dr. Kaye of the various sanitary equipments of camp life followed, and the party was greatly interested throughout the inspection, which was made under ideal weather conditions. On leaving the camp, a visit was made to the Yorkshire Institute for the Deaf, a tour being made of the various premises in the institution, including the swimming baths.

Returning to the Mansion House, the party was entertained to high tea by the mayor, who presided at the table. Dr. Gibson, in proposing a vote of thanks to the mayor for his hospitality, remarked upon the pleasure which he and his colleagues had experienced that afternoon in being accompanied on their several visits by so many members of the Doncaster Corporation. Dr. Gibson then referred to the admirable arrangements which had been made by Lieut.-Col. Kaye for their visits which, he considered, had been greatly appreciated by all the members. Dr. D. Lechmere Anderson, the medical officer of health for Doncaster, was also heartily thanked for his share in the afternoon's work. The deputy mayor, Dr. Kaye, and Dr. Anderson briefly acknowledged the vote of thanks.

A business meeting of the branch followed, at which Dr. J. Aspinall Marsden, the medical officer of health for Shelf and Hipperholme, was elected a member.

The resolution of the North-Western Branch relating to remuneration for additional work under the Mental Deficiency Act was considered, and adjourned to the next meeting.

Northern Branch.—An Ordinary Meeting of the Branch was held in Dr. Kerr's office, Town Hall, Newcastle-upon-Tyne, on Friday, April 23rd, 1915.

Present:—The President (Dr. J. W. Smith), Drs. A. Smith, H. Kerr, W. H. Dickinson, J. W. Hembrough, J. Taylor, H. Renney, and L. L. Fyfe. The minutes of the previous meeting on March 5th were read and confirmed.

SUMMER MEETING.—The President suggested that the summer meeting might this year be held at Ryton. He would be glad to entertain the

members at lunch, after which a visit to Blanchland might be made by motor. The meeting heartily thanked the President for his invitation, which was accepted. The date of the meeting was fixed for Friday, June 18th.

Dr. Dickinson read a paper on "The Family in Relation to Pulmonary Tuberculosis."*

RECENT PUBLIC HEALTH LITERATURE.

Accidents.

WILLIAMS (T. A.). Neurotic disturbances after accidents in relation to workmen's compensation. *New York Med. Journ.*, 1915, *ci*, 102.

Age and Vitality.

EWART (R. J.). The influence of the age of the parent on the vitality of the child—a first study. *Journ. of Hygiene*, 1914, *xiv*, 453.

Blackwater Fever.

HATORI (J.). Blackwater fever in Formosa. *Ann. of Trop. Med. & Parasitol.*, 1914-15, *viii*, 641.

Bread.

JACOBS (B. R.) and LE CLERC (J. A.). A report of a chemical and bacteriological study of wrapped bread. *Amer. Journ. Pub. Health*, 1914, *iv*, 721.

Cholera.

BRADDOCK (C. S.). Some notes on Asiatic cholera: Its prevention and treatment. *Internat. Clinics*, 1914, 24th ser., *iv*, 69.—CROWELL (B. C.). Notes on the diagnosis of Asiatic cholera at autopsy. *Philippine Journ. Sci.*, 1914, *ix*, B. 361.—DOPTER (C.). La prévention du cholera par les vaccinations anticholériques. *Ann. d'Hyg. Publique*, 1915, 4^{me} sér., *xxiii*, 65.

Cremation.

BUCKNILL (I. J. R.). Cremation: The only rational means of the disposal of the dead. *Journ. Roy. Sanit. Inst.*, 1915, *xxxvi*, 54.

Crime.

BRANTH (J. H.). Physical defects and crime. *New York Med. Journ.*, 1914, *c*, 1251.—LEE (E. W.). Physical defects a factor in the cause of crime. *New York Med. Journ.*, 1914, *c*, 1246.—SMITH (M. H.). Crime, alcohol, and other allied conditions in Staffordshire. *Journ. Ment. Sci.*, 1915, *lxi*, 98.

Diet.

TORREY (J. C.). The fecal flora of typhoid fever and its relation to various diets. *Journ. Infect. Dis.*, 1915, *xvi*, 72.

Diphtheria.

HOLM (M. L.) and CHAMBERS (E. R.). Direct swab examination for the early diagnosis of diphtheria. *Public Health*, Michigan,

1914, N.S. II, 595.—McMASTER (A. B.). The administrative control of diphtheria. *Journ. Roy. Sanit. Inst.*, 1915, *xxxvi*, 76. Discussion, p. 85.—SNELL (E. H.). The utility of the hospital isolation of diphtheria. *Journ. Roy. Sanit. Inst.*, 1915, *xxxvi*, 80. Discussion, p. 85.

Disease.

GLEASON (W. S.). Obscure causes of disease. *Medical Record*, N.Y., 1915, *lxxxviii*, 48.—REA (B. F.). An economic view of disease. *New York Med. Journ.*, 1915, *ci*, 117.

Drug-Habit.

ARMSTRONG-JONES (R.). Drug addiction in relation to mental disorder. *Brit. Journ. Inebriety*, 1915, *xii*, 125.

Dysentery.

GETTINGS (H. S.). Bacillary dysentery. *Trans. Socy. Trop. Med. & Hyg.*, 1914-15, *viii*, 111. Discussion, p. 125.

Epidemics.

EPIDEMIOLOGY of whooping cough, measles, scarlet fever and diphtheria in Cleveland for 1913. *Cleveland Med. Journ.*, 1914, *xiii*, 843.

Eugenics.

DARWIN (L.). The need for eugenic reform. *Trans. Med. Chir. Socy. of Edinburgh*, 1913-14, *xxxiii*, 1.

Feeble-minded.

BARR (M. W.). Prevention of growth and extension of care of our feeble-minded population. *Alienist and Neurol.*, St. Louis, 1914, *xlii*, 370.—DUNSTON (J. T.). The problem of the feeble-minded. *South African Med. Rec.*, 1914, *xii*, 330; 345.

Fever.

FRETZ (CAPT. W. L.). Fevers in Peshawar. *Journ. Roy. Army Med. Corps*, 1914, *xxviii*, 518.

First Aid.

McCASKEY (D.). What first aid in railway surgery does not mean; and what it actually does mean. *Med. Rec.*, N.Y., 1915, *lxxxviii*, 259.

Fleas.

BACOT (A.), PETRIE (G. F.), and TODD (CAPT. R. E.). The fleas found on rats and other rodents, living in association with man, and trapped in the towns, villages and Nile boats of Upper Egypt. *Journ. of Hygiene*, 1914, *xiv*, 498.

Heredity.

INGHAM (S. D.). Some considerations of heredity. *New York Med. Journ.*, 1915, *ci*, 110.

Ice Cream.

BAHLMAN (C.). Ice cream studies in Cincinnati. *Amer. Journ. Pub. Health*, 1914, *iv*, 1009.

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HOUSEHOLD THRIFT.

THE discussion introduced by Dr. H. Meredith Richards on "Thrift in Food Supplies," reported in the July number of PUBLIC HEALTH, is a useful and timely contribution to a subject which in these days should make some appeal to the imagination of our people. Retrenchment and economy in general affairs are to be the watchwords of those who serve the country in public life. It would be a revelation to the private citizen if it could be shown to him how great was the service he could give the State by the enlightened application of this spirit in matters of household management.

Food is not by any means the only item in this category which would be found to call for consideration. It is, however, in many respects the most important one, as it is especially bound up with the health and efficiency of the family.

Food is one of the largest and most costly of our imports, and for this reason it is particularly desirable that expenditure upon it should be reduced, as far as possible, within the bounds of safety. The question as to what precisely are those bounds is, of course, a matter which, in its more recondite aspects at any rate, most people would find difficulty in deciding satisfactorily without some expert guidance. In the case of this country, there is an exceptionally wide margin for economy in food before encroaching on such questions as what are the minimum amounts of protein or other constituent parts of food which are essential in maintaining health. Our normal preventable waste of food-stuffs is very great and prevails more or less in all classes of the community.

Reform in the matter of waste can, however, only be properly secured by the diffusion of better knowledge on the subject of cookery and household management. We have, undoubtedly, as a nation been at a great disadvantage for lack of this knowledge in

the past, and if the urgency of present circumstances should create a desire for it, and at the same time means for acquiring it, a very great gain might be placed to the credit side of our account in these times of vast expenditure and loss.

The Parliamentary War Savings Committee are endeavouring to popularise the idea of thrift in all its aspects. The matter is being discussed in the press and on the platform. It may be hoped that by such means the interest of the general public will be aroused, and that the people will be glad to find a patriotic service in which all can take part. Pamphlets and leaflets are all very well for the purpose of advertising an idea, but something more is needed in order to fix it and turn it to practical use. What will now be needed in this particular case is personal teaching of a practical kind. The Board of Education have issued a useful pamphlet on economy in food, with some suggestions for simple and nourishing meals for the home, and are encouraging local education authorities to supplement the teaching on domestic subjects already given in their schools, by more informal instruction adapted to the needs of housewives and others who would be unable to attend ordinary courses. This is a good beginning, but there would seem to be ample room for a wide extension of practical teaching among all classes of the community. Societies are in existence which are interested in work of this kind, and there are not lacking large numbers of intelligent women who would doubtless be eager to volunteer as teachers in any suitable organisation for carrying out work of this kind.

A number of medical officers of health have already done good work in their districts in popularising the study of food questions and food economy. Much can be done in this direction by medical officers of health, and their aid would be invaluable in encouraging and guiding local voluntary efforts to secure a wider diffusion of practical knowledge among our people on this important matter.

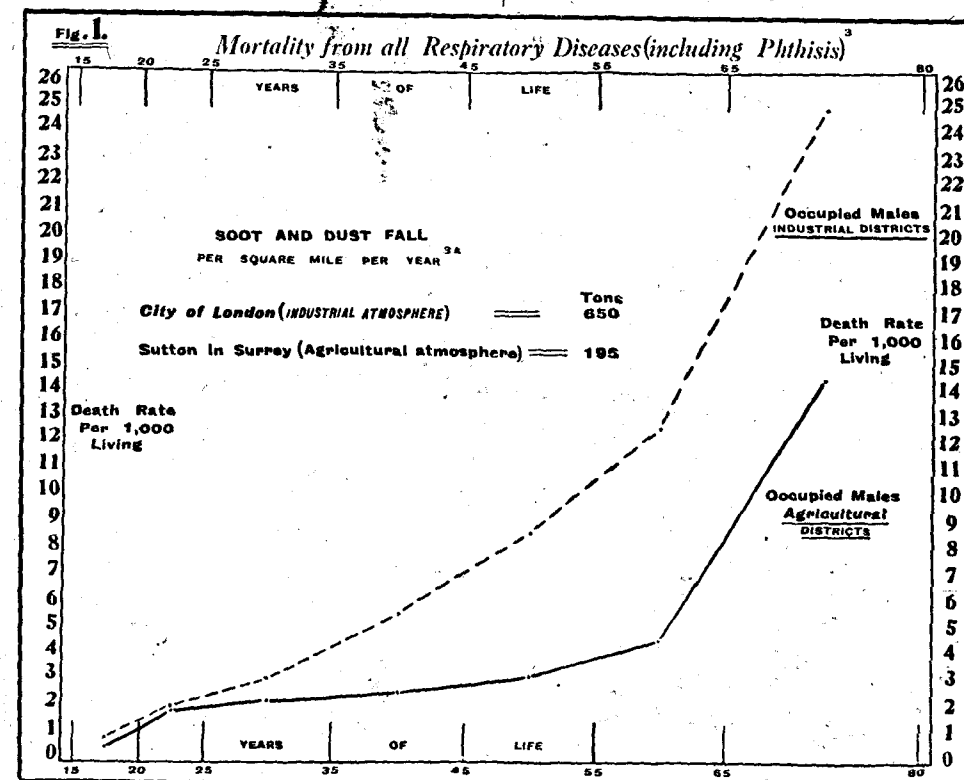
* To be published in a future number.

MILROY LECTURES (1915).

INDUSTRIAL PNEUMONOCOINOSSES,
WITH SPECIAL REFERENCE TO
DUST-PHTHISIS.BY
EDGAR L. COLLIS M.B. (Oxon.),
H.M. Medical Inspector of Factories."Old things need not be therefore true,
O brother men, nor yet the new;
Ah: still awhile the old thought retain,
And yet—consider it again."—A. H. Clough.

THE present time, when the recent report of the Royal Commission on Metaliferous Mines and Quarries (1), by drawing attention to some of the effects which follow

struction of our air passages, however, which are specially contrived to impede the entrance of dust; the amount of inorganic matter which nevertheless is found after death in our lungs—an amount which increases with age (2); and the excessive mortality from respiratory diseases experienced by dwellers in dusty atmospheres—an excess which increases with age (see fig. 1), and with the amount of dust present (see table 1); indicate that dust inhalation plays an important part in determining the mortality from respiratory diseases experienced by the general population.



upon the inhalation of dust, has stimulated inquiry into this subject, is opportune for reviewing our knowledge of dust diseases inherited from the past, and considering it again in the light of more recent investigations. The title chosen for the present course of lectures, Industrial Pneumonocoineses, or diseases of the lungs induced by dust inhaled during occupation, may seem somewhat tautologous, because the existence of pneumonocoineses (a term of Greek derivation, πνεύμων, lung, and κόινος, dust, introduced by Zenker) (102) apart from occupation is not generally recognised. The con-

Table 1.

RELATION OF ACUTE LUNG DISEASES TO FOG ⁴		
City of Manchester		
Period	Fog Days	Death Rate Per 1,000 from Acute Lung Diseases
1896-1900	36 '8	5 '04
1901-1905	23 '4	4 '25

Other influences may affect this mortality, but I shall attempt to show that dust inhalation plays a part by discussing its relation to the main respiratory diseases, asthma, bronchitis, pneumonia and phthisis. The

general atmosphere, especially in closely populated districts, contains dust, but the varied conditions of industrial life present opportunities in an intensified form for observing the effect exerted by different dusts; and I intend, therefore, to deal with the mortality and invalidity suffered by operatives exposed to such intensified conditions.

Dusts may be divided into two groups, the first containing particles capable of exhibiting the phenomena of life, i.e., germs, and the second containing particles which do not possess this capacity. Knowledge of the existence of germs, or microbes, came from the brilliant work of Pasteur, but diseases of

human industries," and Sir Charles Lyell (5) and Dr. Isaac Taylor (6) have described such localisation in prehistoric factories for the manufacture of flint implements. From one of these factories, Grime's Graves, near Brandon, ascribed by Reginald Smith (7) to the palæolithic period, human remains—one the calvaria of a man, the other the skeleton of a young child—undoubtedly belonging to the people of the period in which the mines were worked, have recently been added to the museum of the Royal College of Surgeons.

I have shown (8) that to-day the flint-knappers of Brandon, the lineal occupational representatives of this the oldest of industries, who still use tools similar in shape to

Table 2.

Table comparing the Mortality from Phthisis of Flint Knappers with that of certain other Classes.

Class.	Cause of Death, stated as Percentages, from				Total Number of Deaths.	Average Age at Death.	Calculated Death-rate from Phthisis per Annum among 1,000 living.
	All Causes.	Phthisis.	Respiratory Diseases other than Phthisis.	All other Causes.			
Flint knappers (average number employed for 25 years estimated at 16·5).	100·0	77·8	7·4	14·8	27	46·0	41·0
Wives (2) and widows (11) of flint knappers.	100·0	0·0	15·4	84·6	13	73·0	0·0
Brandon rural district† (population about 5,150)	100·0	6·5	11·7	81·8	63	—	0·8
All males‡ (England and Wales, 1900-02)	100·0	11·2	17·6	71·2	509,567	Median age at death between 56 and 57.	1·6

† The figures for this class, supplied by Dr. A. Harris, M.O.H., Thetford, Norfolk, are for all ages, 1901-10.

‡ The figures for this class, calculated from the Supplement to the Sixty-fifth Annual Report of the Registrar-General, are for all males age 15 years and upwards, 1900-02.

the lungs arising from microbic life, except when they occur in lungs modified by the inhalation of particles belonging to the second group, are not considered as pneumonocoineses, a term which should be restricted to disturbances in health following upon changes induced in the lungs by inhalation of non-viable particles. And just as all germs are not pathogenic, so all kinds of non-viable particles do not give rise to pneumonocoineses. Hereafter I shall use the word "dust" to denote non-viable particles.

How early in the history of mankind industrial pneumonocoineses appeared is a subject for interesting conjecture. Herbert Spencer, in his account of human progress, says the starting-point was "localisation of

the deer-horn picks of their prehistoric ancestors, suffer a terrible mortality from phthisis induced by flint dust generated in their work; and early last century Bourgoin pointed out the ravages produced among the population of Meuse in France by the introduction of the gunflint industry. "By a fate," says Chateaufort (9), "which seems connected with all that concerns the art of war, this industry slays those who follow it; it kills them before their time; for them there is no old-age. When asked the cause of so premature a mortality, doctors and officials give the same reply—pulmonary phthisis induced by prolonged inhalation of dust generated from working flints." Probability suggests, therefore, that the starting-point of

human progress was associated with at least one form of industrial pneumoconiosis, and that, if tuberculosis affected prehistoric man, the mortality experienced must have been as severe as that found in existence to-day. "At hercule homini plurima ex homine sunt mala." (16)†

In historic times references are to be found in the works of ancient writers who, however, seldom distinguish between the various forms of respiratory disease, but rather refer to a general connection between lung affections and dust inhalation. For this reason the history of pneumoconioses is best taken as a whole, rather than separately for each form of respiratory disease. Since extracts from ancient writings, apart from archaeological interest, are apt to be wearisome, I shall only make references which illustrate definite points. Hippocrates in his *Epidemics* (in a rather obscure passage of which Ramazzini, with his knowledge of occupational diseases, though differing with Galen and Farr, gives an interpretation closely adhered to by Littré) (10) speaks of the metal digger (ὁ ἐκ μεταλλῶν) who, we may presume, was exposed to dust in his work like the metalliferous miner of later days, as a man who "has his right hypochondrium bent, a large spleen, and a costive belly; he breathes with difficulty (πνευματώδης), is of pale wan complexion, and is liable to swellings in his left knee." (11). Here the father of medicine refers to three points of interest: (a) constipation, to relieve which men exposed to dust inhalation to-day constantly take aperient medicine; (b) shortness of breath, which is invariably the first, and in some cases the only objective sign of damage caused by dust inhalation; and (c) swelling of the knee-joint, which probably represents the disease scheduled to-day among those entitling to compensation as miner's beat knee. Pliny the Elder, in his *Natural History*, speaks (17) of the use of respirators to avoid dust inhalation, "qui minium in officinis poliunt, faciem laxis vesicis illigant, ne in respirando perniciosam pulverem trahant: et tamen ut per illas spectent." A similar device is also referred to by George Bauer, who wrote under the "nom-de-plume" of Georgius Agricola, in his famous work *De Re Metallica* (18), published in 1557. This mediæval writer, who strongly advocated the ventilation of mines,

and whose illustrations anticipated many modern methods, tells how "other mines are very dry, and the constant dust enters the blood and lungs, producing that difficulty of breathing the Greeks call asthma. When the dust is corrosive it ulcerates the lungs and produces consumption, hence it is that in the Carpathian mountains there are women who have married seven husbands, all of whom this dreadful disease has brought to an early grave. At Altenberg, in Meissen, . . . the men . . . bind loose coverings (bladders) to their faces. By this means the dust is not carried into the lungs and blood, and does not hurt the eyes." This is a remarkable passage indicating how asthma follows dust inhalation, how only certain "corrosive" dusts cause consumption, and how female contacts do not contract the disease. Löhneiss, referring to miners in 1690, states (19) the morbid sequence of events even more clearly: "The dust and stones fall upon the lungs, the men have lung disease, breathe with difficulty, and at last take consumption." Ramazzini quotes (12) a description given by Diembroek of several stone-cutters who died asthmatic, "in whose lungs he found such heaps of sand, that in running the knife through the pulmonary vesicles he thought he was cutting some sandy body"; and describes how stone-cutters "oftentimes suck in, by inspiration, the sharp, rough, and cornered small splinters or particles that fly off; so that they are usually troubled with a cough, and some of them turn asthmatic and consumptive" (12). The same author, quoting (13) from the *Acta Hassniensia*, describes pleurisy in a potter, "in whose dissected corps the right lobe of the lungs was found grown to the ribs and tending to a withered dryness and a phthisick; this indisposition of his lungs being attributed to the trade he had worked at"; and his description of the manufacture of earthenware, which is "first baked in a furnace, then covered with lead calcined, pounded with powdered flint and melted, and then put into the furnace again," shows that the potter of that day was exposed to the inhalation of flint dust, which has long been recognised in this country to be injurious. Thus a patent for grinding flints by a wet method granted in 1713 to Thomas Benson, of Newcastle-under-Lyme, states that previously flints were pounded dry, which process "proved very destructive to mankind inasmuch that any person, ever so healthful and

strong, working in that business, cannot possibly survive over two years, occasioned by the dust sucked into his body by the air he breathes" (20).

While these quotations display a recognition of a causal relationship between dust inhalation and consumption, that piquant observer, Ramazzini, who went personally to inspect the trades he speaks of, knew that some dusts, though injurious, did not tend to the development of consumption, for he tells (14) how there flies out of hemp and flax "a foul mischievous powder, that, entering the lungs by the mouth and throat, causes continual coughs, and gradually makes way for asthma"; and, after describing the process of combing silk cakes, he remarks (14) that "the poor people that comb these threads are usually troubled with a vehement cough, and a great difficulty of breathing, and few of them live to old age in that way of business. The virulence that gives rise to this tragedy is owing to the cadaverous particles of the silkworm that are mixed with these cakes." Note how he distinctly refuses to ascribe the trouble to silk dust (in which he is borne out by the much later work of Givre) (27), and also the omission of any reference to consumption in either of these trades. He is even clearer in speaking (15) of men who sift corn and who "are so plagued with this powder or dust, that when work is done they curse their trade with a thousand imprecations. The throat, the lungs, and the eyes sustain no small damage by it, for it stuffs and dries up the throat; it lines the pulmonary vessels with dusty matter that causes a dry and obstinate cough; . . . hence it is that almost all that live by that trade are short-breathed, and cachectick, and seldom live to be old; nay, they are apt to be seized with an orthopnoea, and at last with a dropsy." Surely an excellent clinical description of dust-bronchitis, emphysema, dilated heart, and failure of circulation.

These distinctions, implied or definitely stated, between the types of respiratory trouble which follow inhalation of different dusts, are the more notable, because even to-day pneumoconioses are pigeon-holed in clinical teaching as a single entity, ascribed to exposure to any and every form of injurious dust, of which pulmonary fibrosis sums up the pathological findings and phthisis the morbid result.

Such generalisation has probably resulted from the publicity accorded to certain special inquiries into the prevalence of dust-phthisis, for example, that of Prof. Alison, who, when speaking (21) of "that modification of phthisis which occurs in middle and advanced life, . . . in those workmen who are much exposed to irritation of the lungs, particularly such as are in the constant habit of inhaling various fine powders into their lungs," says, "I have reason to believe that there is hardly an instance of a mason regularly employed in hewing stones in Edinburgh, living free from phthisical symptoms to the age of 50." The newer parts of Edinburgh were then being built out of Craigleith sandstone, the supply of which is now exhausted. This industrial disease was shown by Gulland to persist among Edinburgh masons in this century (33); and was deplored by that famous writer, geologist, and stone-mason, Hugh Miller, who, when telling of his own narrow escape, writes (22):—

"My general health, too, had become far from strong. As I had been almost entirely engaged in hewing for the two previous seasons the dust of the stone, inhaled at every breath, had exerted the usual weakening effects on the lungs—those effects under which the life of the stone-cutter is restricted to about forty-five years; but it was only now, when working day after day with wet feet in a water-logged ditch, that I began to be sensibly informed, by a dull pain in the chest, and a blood-stained mucoid substance, expectorated with difficulty, that I had already caught harm from my employment, and that my term of life might fall short of the average one."

And later:—

"The dust of the stone which I had been hewing for the last two years had begun to affect my lungs, as they had been affected in the last autumn of my apprenticeship, but much more severely; and I was too palpably sinking in flesh and strength to render it safe for me to encounter the consequences of another season of hard work as a stone-cutter. From the stage of the malady at which I had already arrived, poor workmen, unable to do what I did, throw themselves loose from their employment, and sink in six or eight months into the grave—some at an earlier, some at a later period of life; but so general is the affection that few of our Edinburgh stone-cutters pass their fortieth year unscathed, and not one out of every fifty of their number ever reaches his forty-fifth year."

And again:—

"I remained for several months in delicate and somewhat precarious health. My lungs

† "So surely do most of mankind's ills from mankind come."

had received more serious injury than I had at first supposed; and it seemed at one time rather doubtful whether the severe mechanical irritation which had so fretted them that the air passages seemed overcharged with matter and stone dust, might not pass into the complaint it stimulated and become confirmed consumption."

That such generalisation, however, is not justified was claimed by Thackrah, who stated (23) that "dust of every kind irritates, but not in an equal degree"; and he quotes (24) the longevity of bricklayers and lime-workers, instancing the old adage, "bricklayers and plasterers' labourers, like asses, never die." He recognised that masons inhaling "particles of sand and dust which arise from chipping stone . . . are short-lived, dieing generally before they attain the age of forty" (25), and cites Patisier's account of phthisis among the stone-dressers of Saint-Roch (known as the disease of Saint-Roch) and Merat to support him; but he noted that "in the lead mines of the North of England, the men are injured by working ore in sandstone, but are sensible of no inconvenience when the ore is in limestone" (26). Thackrah also dwelt on the prevalence of phthisis among the metal grinders of Sheffield, and instances Dr. Knight's opinion that fork-grinding ought to be confined to criminals (28). A few years later Calvert Holland established statistically the sad phthisis mortality experienced by fork-grinders who worked on dry stones, "and the dust which is created, composed of fine particles of stone and metal, rises in clouds and pervades the atmosphere. The dust is thus every moment inhaled . . . and produces permanent disease of the lungs" (29). He portrays the lives of these workers, and then uses these vigorous words: "We do not hesitate to assert that this is a picture of wretchedness which has no parallel in the annals of any country, or in the records of any trade. . . . Fiction can add no colour or touches to a picture like this. Truth transcends the gaudy embellishments of imagination. The distempered fancy has here no room to exercise her powers" (30).

By this time the collection of national mortality statistics, inaugurated in 1832, was providing data for investigations; and Dr. Farr, the first superintendent of statistics, placed valuable information (31) as to the prevalence of respiratory diseases, and in particular of phthisis, among the tin-miners

of Cornwall, and the lead-miners of the North of England, before the Royal Commissioners appointed in 1862 to inquire into the health of men employed in metalliferous mines. Dr. Peacock, physician to St. Thomas' Hospital, who, on account of the attention he had paid to respiratory diseases, and in particular because of his work on the phthisis mortality of millstone builders (36), a mortality ascribed by him to the dust generated in dressing bluestone, was called in to assist these commissioners; and his careful report, a splendid clinical study still worth close attention, based on an examination of over 600 miners, together with evidence from local medical men, established the existence of "miner's disease," thus giving the clue to the mortality figures of Dr. Farr. Peacock, in describing the disease (32) carefully distinguishes it from ordinary phthisis.

"The form of the disease in which there is local consolidation in some portion of the lungs, bears a close general resemblance to true consumption, and especially where, as often happens, the voice is husky and the patient expectorates blood. There are, however, features by which it is sufficiently distinguished from that disease. It usually occurs in persons who do not present any hereditary disposition to phthisis—their parents and other relatives often having attained advanced ages and being quite healthy. It commences at a later period of life than phthisis, indeed, in persons who have reached ages at which consumption is by no means of frequent occurrence. It is also much slower and less active in its progress, so that in persons who have been ill for several years the signs often do not indicate extensive or advanced disease. The quickness of pulse, the rapid and extreme emaciation, and the night perspirations so characteristic of true phthisis, are also generally absent or only slightly marked, and there is rarely diarrhoea, indeed, the bowels are often obstinately confined."

As a source of information the Report of the Commissioners is invaluable, but, notwithstanding the evidence of several witnesses, particularly the miners themselves, that the "stour" or dust was far worse than anything else they had to contend with, the conclusion arrived at, based, I may say, on practically unanimous medical opinion, that the influence of dust was subsidiary to the many other adverse conditions of ventilation, exposure to fumes of explosives, and variations of temperature, which at that time surrounded the mining industry, was unfortunate. At that time, however, all researches

into the causation of phthisis, for example, the writings of Alison (21) and of Chateaufort (9), were proving the importance of bad housing, poverty, and lack of ventilation, and, although the prevalence of phthisis in certain dusty industries was noted, the absence of the disease in other dusty industries obscured the issue, and Peacock, influenced by the thought of his day, may be forgiven for ascribing the prevalence of the disease to the imperfect hygienic conditions he saw, rather than to the then disputed point of dust inhalation. Fifty years later a Departmental Committee, of which Dr. J. S. Haldane was a member, was appointed in 1902 to reinvestigate the causation of the still persistent high phthisis mortality among Cornish tin-miners; and this committee brushed aside every other influence except dust inhalation, deciding (34) that—

"So far as the Cornish miners are concerned it seems evident enough that stone-dust which they inhale produces permanent injury of the lungs—gradually in the case of ordinary miners, and rapidly in the case of machine-drill men—and that this injury, while it is apparently capable of gradually producing by itself great impairment of the respiratory functions, and indirectly of the general health, also predisposes enormously to tuberculosis of the lungs, so that a large proportion of miners die from tubercular phthisis. That the primary injury to the lungs is due solely to inhalation of stone-dust would seem to be practically certain."

In the decade preceding the work of the Mines' Commissioners of 1862, organised study of public health had commenced; and we find H. Headlam Greenhow appointed to lecture on public health at St. Thomas' Hospital. In the elaborate statistical inquiry he carried out in preparing his lectures he immediately found that "one of the most evident facts brought to light . . . is the influence of occupation on health." With this Finlaison's conclusion, arrived at (51) in 1853, is in close accord, that "the real practical difference in the distribution of sickness seems to turn upon the amount of the expenditure of the physical force. The density of aggregation, described under terms of city, town, or rural districts, seems to exercise little or no real influence"; and this fundamental point was restated (52) in 1903 by Watson, who said, "The proportion of members sick during any year varies with occupation." Greenhow's investigation proved of

such importance that Mr., later Sir, John Simon, then medical officer to the General Board of Health, brought it to the attention of the Board, by whom it was published. Shortly after Simon became medical officer to the Privy Council, and he entrusted to Greenhow the duty of pursuing the subject further by visiting the great industrial centres. The reports which followed in 1861 (38) and 1862 (39) have formed a mine of information from which later writers have freely drawn; they are the first example of State medical inspection of factories, and are a monument to Simon's sagacity in grasping the great influence exerted by occupation upon health, and to Greenhow's keen insight and powers of observation. Throughout these reports runs as a theme the influence of dust inhalation in causing pulmonary disease, whether among lead-miners in Yorkshire, tin-miners in Cornwall, needle-pointers in Alcester, cotton operatives in Lancashire, flax-hecklers in Pateley Bridge, metal grinders in Birmingham and in Sheffield, coal-miners in South Staffordshire and in South Wales, or stone-dressers in Stroud. Why work so well started was then allowed to lie dormant for so long, while other aspects of public health were being strenuously developed by medical officers of health with inspectors of nuisances appointed for every town and district, reinforced now by a battalion of tuberculosis officers, is astonishing.

Stimulated by what he had seen in industrial centres Greenhow obtained specimens of workers' lungs, and between 1860 and 1870 from time to time described the conditions he found before the Pathological Society, and his reports in the Transactions of those years have been relied upon by subsequent workers to establish the pathology of pneumonococcoses. The specimens themselves are still preserved in the museum of the Middlesex Hospital. At this time Virchow, Zenker, Knauff and other Continental workers were also dealing with the subject, but there is no record of personal inspection of industries like Greenhow's.

The period of Pasteur's marvellous work now followed, and, arising from it, Lister's methods of antiseptic surgery, and the discovery by Koch in 1882 of the tubercle bacillus. Soon after this Arnold (95) published a comprehensive monograph on the subject of dust inhalation, in which he pointed out that dust particles may be found in the liver,

spleen, and bone marrow, as well as in the lungs; but for the moment the germ causation of disease diverted attention from the influence of dust: yet ten years later Arlidge wrote (40): "I doubt if these bacilli actually develop phthisis, unless there be some antecedent change in the vitality of the affected tissue; a change wrought by depressing causes connected with the mode of life, or with constitutional debility and inherited taint, or with occupation followed; of which contributory factors two or more may co-operate. And assuredly the breathing of dust may be reckoned as one such of no slight energy." The painstaking observations of this authority, however, and the productive labours of Oliver, need no mention here; they form the basis of our present-day knowledge, and are to be found in every text-book on the subject.

The researches just summarised compel us to recognise that respiratory diseases are influenced by dust inhalation; but some plan must be adopted in dealing further with the subject. Classification has been attempted by Hirt (74), Arlidge (40), and others on various plans, based usually on consideration of dusts, either by origin, animal, vegetable, or mineral (first suggested by Chateauneuf) (9), or by physical properties, hardness, sharpness, or the like; but such classifications have brought dusts which produce different pathological results into the same class. Recently, however, Heim and Agasse-Lafont have suggested (41) that the effects caused should be the basis of classification, and I intend adopting this suggestion, and considering first the relation of each of the main respiratory diseases to dusts, and then from that standpoint examining the properties of the dusts which are associated with an undue prevalence of each of these diseases.

Without, however, anticipating subsequent consideration of these properties, *size* may here be referred to. Dust particles to be inhaled must be sufficiently small to remain suspended in moving air, and so be carried into the air passages. Virchow, in the middle of last century, for a time doubted whether inhaled dust gains access to the lungs, and maintained that the pigment found in the lungs of city dwellers was derived from blood pigment, and not from inhaled carbon; but the work of Knauff (35), who, after exposing dogs to fumes of a smoky lamp for periods varying from one day to three months, showed

that carbon was found in the lungs in amount varying directly with the length of exposure, and of Zenker, who demonstrated (103) the presence of excessive amounts of oxide of iron in the reddened lungs of factory workers exposed to the fine powder of rouge, which is composed of this material, in making gold-leaf and in polishing mirrors, finally convinced him that inhaled dust reaches and is deposited in the lungs. [A portion of one of Zenker's original specimens is in the museum of St. Thomas' Hospital (No. 1840A); and there is in the Home Office collection, through the courtesy of Dr. J. S. Haldane, an even more convincing specimen taken from a man who worked in ironstone mines in this country, then went to the Transvaal gold-mines, and finally returned home to the ironstone mines. The period of gold-mining is indicated by the presence of grey fibrous tissue, and that of ironstone mining by bright red discoloration (*see frontispiece*).] Possibly a few particles, as suggested by Calmette (42), may reach the lungs through the lymphatic circulation after first entering the digestive tract; but no one has yet produced a condition suggestive of pneumoconiosis by feeding animals on dust, and this channel of entry, as has been pointed out by Oliver (94), may be neglected for practical purposes; while Goadby's experiments (43) which show that lead poisoning is caused one hundred times more easily by inhaling lead dust than by eating it, have demonstrated that this toxic dust is chiefly dangerous because it definitely reaches and is absorbed by the lungs; and, further, W. Watkins-Pitchford's remarks on Transvaal gold-miners that "the lymph nodes in the gastro-hepatic and gastro-splenic omenta, and the mesenteric and retroperitoneal nodes are usually of normal appearance in fatal cases of silicosis" (44) and that he was unable to detect siliceous particles in them, conclusively show that the digestive tract is not the usual path of ingress.

Dust particles inhaled into the air passages may be divided into those which are too large to pass through the finer bronchioles and enter the alveoli, and those which are so small that they can pass through these passages; and upon this simple point may possibly depend differences found to exist between different dusts and the types of respiratory disease associated with their inhalation. The larger particles become

entangled in mucus and are swept away by ciliary action; the smaller ones when they reach the alveoli are removed and carried into the lung tissue by phagocytes, probably through the pseudostomata. How these fine particles are carried into the alveoli is not quite clear. Lister, noticing that "in simple fracture of the ribs, if the lung be punctured by a fragment, the blood effused in the pleural cavity, though freely mixed with air, undergoes no decomposition" (45), concluded that inspired air must be "filtered of germs by the air passages, one of whose offices is to arrest particles of dust, and prevent them entering the air-cells"; and Tyndall, working with a beam of light, showed (45a) that the deeper air of the lungs is optically dark, i.e., free from suspended particles of even ultra-microscopic size. Moreover, if aeration of the blood is carried on by diffusion of gases between the residual air of the alveoli and the inspired air, dust particles can hardly be carried into the alveoli by such diffusion; even though, as Watkins-Pitchford points out, "the alveolar sacs, being surrounded by elastic fibres, undergo a passive dilation and contraction synchronously with the movements of the thorax, and we conclude therefore that this process of 'diffusion' must at least be materially assisted by the rhythmical variations in the capacity of the air sacs. Some physiologists, however, have pointed out that, as the capacity of the trachea, bronchi, and bronchioles is about 140 c.c., and as about 500 c.c. of air pass in and out of the chest during each ordinary respiratory cycle, some 360 c.c. of this tidal air must flow directly into and out of the air sacs—in other words that some of the tidal air must strike right down to the alveoli at each ordinary inspiration. . . . Quite large particles of siliceous mineral are often found in the pulmonary alveoli in early cases of miners' phthisis. Their size is often so great as to render it extremely improbable that they have escaped into the alveolus from the lung tissue, for the particles in the lung tissue are practically all of very small dimensions" (44). Probably we are at any rate justified in considering that during deep breaths, preliminary to a cough or sneeze, stimulated by the necessity for expelling dust-laden mucus, inspired air may carry with it into the alveoli particles of dust sufficiently small to pass through the smallest bronchioles. No particles have been found (46)

in the lung tissue, which exceed 10μ in diameter, and these could have entered in this way; and definite evidence is wanting to show that particles ever pass into the lung tissue through the walls of the bronchi or larger bronchioles.

One further point, *solubility*.—Only particles which are insoluble in the fluids of the body when carried into the air passages remain as foreign bodies either to stimulate the ciliated epithelium to overaction for their expulsion, or, if they gain access to the lymph channels, to give rise to a proliferation of connective tissue; thus dusts of ivory, horn, bone, and other animal structures, and of calcium sulphate (plaster-of-Paris and alabaster), of limestone, and of oxide of iron are not associated with pneumoconioses in the way that dusts of vegetable husks, emery, glass, sandstone and flint are. Generally speaking dusts are more injurious as their chemical composition differs from that of the human body, or from the elements of which the body is normally composed. Other distinctive properties of injurious dust will be referred to when the special respiratory diseases to which they give rise are discussed.

ASTHMA.

Asthma is a term used to indicate a train of symptoms rather than a disease, and *per se* seldom appears as a cause of death on death certificates; therefore, mortality statistics give no indication of its prevalence, indeed, asthma does not appear in the three years, 1910-12, as a cause of death among 195 deaths of cotton-strippers, who are known to suffer markedly from this complaint. That asthma occurs as a result of dust inhalation has already been mentioned. Agricola, in the quotation given (18), referred to its occurrence as the result of dust inhalation among Carpathian miners; Ramazzini refers (14) to it as resulting from the inhalation of flax and hemp dust; Diembroek mentions (12) its occurrence among stone-masons; and later inquiries have confirmed these earlier observations. Thus all writers upon the health of metalliferous miners describe the prevalence of attacks of shortness of breath, which they call asthma. Greenhow, when dealing with Cornish tin-miners, mentioned (38a) that "for the most part they become more or less asthmatical about the age of forty." Greenhow, however, it is only fair to say, remarks

(39a) "the terms 'asthma' and 'asthmatical' are commonly used by various classes of operatives to designate any form of pulmonary disease attended by dyspnoea arising from their occupation. These terms are therefore employed . . . in their popular and not strictly in their pathological sense." Similarly the Committee on the Health of Cornish Miners noted (34a) among tin-miners that "shortness of breath appears to be almost always the first prominent symptom." Greenhow also said (38b) of lead-miners "as life advances, dyspnoea is added to the other symptoms, and at length most of the miners become asthmatical, are unable to move without more or less difficulty of breathing, and suffer habitually from cough and expectoration. . . . The age at which miners for the most part become decidedly asthmatical is about the 45th year"; and a retired lead-miner recently told me that asthma still persists in the Durham lead mines. Cumpston (48) and Summons (49) speak of asthma among Australian gold-miners; and it is referred to by Watkins-Pitchford (44) and in all the numerous reports on Miners' Phthisis in the Transvaal. Arlidge states that "flint-millers . . . suffer sadly with asthma and interstitial pneumonia" (40a); and the same authority says "the features of potters are rather those of asthmatical subjects" (40b).

Personally I have not found asthma prominent either among grinders of metal in Sheffield or elsewhere, or among Aberdeen granite cutters, or among silica-brick makers, and, although some stone-masons have spoken of it, I have not found that asthma (as distinguished from attacks of air hunger) is common among them, although all suffer in excess from dust-phthisis; and West, when speaking (47) of the extreme shortness of breath exhibited by these workers, says "this is often spoken of loosely as asthma, but true spasmodic asthma is by no means common." On the other hand operatives exposed to certain dusts do suffer in a marked degree from true asthma; and I think that attacks of dyspnoea, which occur in cases of dust-phthisis, are essentially different in causation and character from such cases of asthma. True dust-asthma, which I have seen in a pronounced form among cotton strippers, is associated with a physical configuration of the chest, and a type of breathing quite different from those seen among operatives who experience a heavy mortality from dust-

phthisis. The course of the disease was far more distressing and more liable to invalidate the sufferer than the dyspnoea described among gold-miners and others.

Cotton-strippers are exposed, at one of the first processes of cotton spinning, to dust arising from cotton husk and débris which is thrown in a fine cloud into the air when the cylinders of cotton carding-machines are brushed out or "stripped." The amount of dust generated varies with the grade of cotton used, and is greatest from coarser grades, particularly from Surat and some American cottons, and least from finer grades, such as Egyptian. Each spinning mill usually deals only with material of special grades, so the effect of the different amounts of dust could be studied at different mills. Thus I found (53) among men working on coarse grades of cotton 91 per cent. more or less affected, on medium grades 72 per cent. and on fine grades 62 per cent.

Exposure to this dust has unpleasant effects for a chance visitor, who, not infrequently, suffers within twelve hours from an attack of mill fever, with sharp but transient febrile symptoms, but operatives soon become inured to such attacks. An operative stripping cotton-carding machines, after years of work, varying from five to twenty, according to idiosyncrasy and the amount of dust, finds his chest becoming affected; at first the only symptom is difficulty in breathing on Monday morning, or after any interval away from the dust, and after the first day is over he may remain unaffected for the rest of the week. As time passes this difficulty becomes worse and extends later and later into the week, developing into a typical form of asthma as long as he is in the dusty atmosphere. At the same time he loses flesh and becomes thin in face and body. As the case develops the action of the diaphragm becomes less and less effective, until the only action of this great respiratory muscle is to fix the lower ribs. At the same time the superior intercostal muscles and the extraordinary muscles of respiration are more and more called into play to carry on the ordinary act of breathing. The sternum becomes more prominent and the chest barrel-shaped. Meanwhile the extra tax thrown on the lungs leads to some degree of emphysema. There is little or no sputum produced, and what little there is, is expectorated with difficulty. When this stage is reached, *i.e.*,

after about twenty years' work, the individual is usually compelled to seek other employment, and so, although the employment is not arduous, few old men are found at work. I found only 139 aged 45 years and over in every 1,000, as compared with 231 metal-grinders and 434 lace-workers. The distinctive symptoms experienced are attacks of spasmodic asthma precipitated by exposure to dust. The trouble is, however, rapidly disappearing owing to improved methods of dust prevention, which are even enabling affected men to resume their employment. These operatives do not suffer markedly from phthisis, though there is some slight excess late in life; but they experience a high mortality from pneumonia, and an excessive mortality from bronchitis.

Other cotton-operatives, weavers, occasionally suffer from an acute form of spasmodic cough with asthmatic symptoms, but this affection I believe (90) to be due to inhalation of a special mildew which from time to time appears on cotton thread; this disease, however, since it is probably a form of aspergillosis, does fall within the definition previously laid down of a pneumoconiosis, and only calls here for passing mention.

Greenhow had previously noted (38c & 39b) that carding-room operatives, especially those who strip the cards and the card-grinders, were very apt to become asthmatical about middle life in proportion to the amount of dust generated which varied with the grades of cotton used; but at that time the dust, owing to hand-stripping, was not generated so freely as when I made my inquiry, and Greenhow gives no clinical description of the disease. He did, however, describe (38d) the same condition among flax-hecklers at Pateley Bridge, where he found at one factory 23 out of 27 hecklers habitually asthmatical; he speaks of the older men as short-breathed, with "rounded shoulders, emaciated frames, prominent eyes, and laborious wheezing respiration," and says that to find men aged 60 years at work must be deemed exceptional; and the following passage may be compared with the description given above of cotton-strippers' asthma (which was written without any knowledge of Greenhow's previous work):—

The effect on a healthy stranger of entering these rooms is most unpleasant: the dust floating in the atmosphere irritates the nasal and bronchial passages, producing sneezing and a

sense of oppression in the chest, which do not cease till some time after the visitor has left the apartment. Although the effects of temporarily inhaling the atmosphere of the dusty departments of a flax mill are so obvious, the operatives, after a time, become inured to it, and are able to tolerate it for some time without sensible injury. It was stated that the operatives are more affected by the dust at the beginning of the week, and that they always suffer more on resuming their employment after an interval of cessation. . . . As life advances, the power of resisting the pernicious influence of their occupation diminishes, and more or less of permanent dyspnoea, and other results of bronchial irritation supervene. The ordinary signs of chronic bronchitis, and sometimes of emphysema, may be detected by auscultation.

The observations published in 1873 by Dr. Purdon, of Belfast (61), and the experiences of 14 observers, collected in 1894 by Osborn (50), corroborate this description; for instance, Dr. Lunan, Blairgowrie, stated: "I cannot say I have been able to trace the origin of phthisis to flax dust. I feel quite sure that bronchial catarrh, accompanied in many cases by asthma, is frequently caused by breathing the dusty atmosphere of flax mills"; and Dr. D'Evelyn, Ballymena, said "the hacklers all die young, and all suffer from chronic disease of the lungs, caused by the flax dust. . . . The first thing a hackler does each morning is to drink a glass of raw whiskey, to clear out his bronchial tubes, otherwise he is unable to breathe. After a day off, the men have often told me their breathing is worse." Notwithstanding the then accepted axiom that all forms of dust must predispose to phthisis, five out of the fourteen observers definitely state that flax dust does not have this effect; similarly Givre, speaking of carders of silk, says (27a) "some authorities even deny that these dusts create a predisposition to phthisis; and see a certain antagonism between the emphysema of carders and phthisis."

Inquiries in the flax and jute industries have convinced me that similar asthma still occurs in these industries among operatives exposed to dust generated in the initial stages of textile manufacture—at flax-heckling and at jute-opening—but the symptoms, at least under modern methods of dust removal, are seldom pronounced.

When once this asthmatical condition, which is especially associated with exposure to vegetable husk, has been recognised, its

occurrence in a modified form can be traced among those exposed to dusts of similar origin, such as those arising from wood bark and some of the harder woods—for instance, Powell and Hartley describe (75) the case of a man exposed at his work to the dust of rosewood; this man was subject to severe attacks of dyspnoea, which had the paroxysmal character peculiar to asthma; his symptoms ceased after absence from work, but returned when he resumed his employment which he finally had to give up. True, dust asthma is always associated with an excessive incidence of bronchitis. Thus 32, or 16.4 per cent., of the 195 deaths already referred to among cotton-strippers were due to this cause, as compared with 8.3 per cent. for Occupied and Retired Males.

The distinctive features of this form of asthma are, (i.) occurrence of asthmatic attacks during exposure to dust, and the cessation of attacks on leaving the dusty atmosphere; (ii.) immobility of the diaphragm; and (iii.) over-action of the superior intercostal and extraordinary muscles of respiration. Contrast these with Peacock's description of asthma among Cornish tin-miners with their high mortality from dust-phthisis—"the difficulty of breathing is extreme, and is aggravated by any slight exertion, as by ascending stairs or any slight elevation, and it is usually increased by certain states of the atmosphere and when the patient takes cold. Notwithstanding the great effort which is made in breathing the movements of the chest are most imperfect, there is little change of capacity with inspiratory and expiratory acts, and the respiration is almost entirely abdominal." This type of breathing I have seen among grinders of metals in Sheffield and elsewhere, and among stone-masons, and it has been described by the Committee on the Health of Cornish Miners (34) and by all observers of miners' phthisis on the goldfields of the Transvaal and of Australia.

Broadly speaking, then, there are two distinct types of dyspnoea caused by dust. (1) One type, seen among operatives who suffer from dust-phthisis, in which convulsive but ineffective respiration is carried on by the diaphragm; and Watkins-Pitchford adequately explains (44) the condition as follows: "The phenomenon is quite independent of pleuritic adhesions, and is due

to the gradual loss by the lungs of their elasticity—or, in other words, their capacity of accommodating themselves to the varying capacity of the thorax during respiratory movements. As soon as the lungs have ceased to be distensible, the chest wall becomes fixed; for as the lungs are now incapable of following the chest wall, its outward movement is necessarily opposed by the overpowering pressure of the atmosphere." (2) Another type seen among operatives who do not suffer from dust-phthisis, but who do suffer from bronchitis, in which the diaphragm is fixed and the ordinary type of asthmatic breathing is exhibited. Here the underlying pathological condition is different—the elasticity of the air vesicles is not seriously impaired, but the bronchial mucosa is chronically inflamed and ready, when dust falls on it, to start excessive respiratory impulses. Hence it follows that this form of asthma is provoked by exposure to dust and is of peripheral origin; while the other form is provoked by exertion and is a form of air hunger of central origin, indeed in advanced cases chronic cyanosis is present.

Fifty years ago asthma was common among coal-miners. "Then in every little mining village," writes the secretary of a miners' association, "there was a contingent of old miners, past work, on account of difficulty of breathing, a stage usually reached between forty and fifty years of age"; and this statement is borne out by Greenhow, who tells (39c) of the ravages wrought in his day among coal-miners in South Staffordshire by asthma; "some miners retain their health till an advanced period of life, but the greater number suffer, more or less, from asthmatic symptoms before attaining the age of 50, and many break down and are disabled at 40 to 50 years of age. . . . a miner is usually an old man at 50; and few men . . . are found at work beyond that age." The same observer also mentioned (39d) the disease as prevalent in the South Wales coal-field, and while attributing it to bad ventilation of the mines, states that the miners blamed the fumes from explosives. He contrasts (39e) the condition with that seen among lead-miners and tin-miners, as one with emphysema more frequent, with less pneumonia, developing later in life, and, while associated with chronic bronchitis, not associated at an early period of life with

slight dyspnoea. In America Drs. Wainwright and Nichols report (88) that, at Scranton, asthma accounted, 1894–1904, for 7 per cent. of all deaths amongst coal-miners, as compared with 1.6 per cent. amongst all occupied males; and these observers state that the condition as seen among the miners is one of chronic bronchitis and emphysema. Synchronous, however, with improved ventilation of mines the disease has disappeared in this country: improved ventilation has minimised exposure to several adverse influences, e.g., fumes from explosives, soot and other products of combustion from naked lights, gaseous impurities, and dust. The opportunity of ascertaining which was the determining cause has gone, and also of obtaining a good clinical description of the condition; but the following note sent me by Dr. J. Taylor, Chester-le-Street, taken in conjunction with Greenhow's observations, suggests that coal-miners' asthma was true spasmodic asthma. Dr. Taylor writes: "One case only do I recollect. In this case the breathing was carried on by the respiratory muscles of the chest, and the diaphragm did not enter much into the mechanism of inhalation. This patient suffered at all times of the year, but a windy day always appeared to be the starting point for an attack." If the supposition is correct that coal-miners' asthma was true asthma, possibly the miners were correct in ascribing it to fumes from explosives, which, as Oliver has pointed out (89), would contain nitrous fumes; and in this case the disease should not be classed as a pneumoconiosis. The disease, however, common though it used to be, has passed almost unobserved from our midst, and conjecture as to its character and causation are idle.

(To be continued.)

LIST OF REFERENCES.

1. Second Report of the Royal Commission on Metalliferous Mines and Quarries, 1914, pp. 133–155. Wyman & Sons, Ltd. (Cd. 7476.)
2. Ibid. p. 141.
3. Ibid. p. 144.
4. Chemical Pathology, 1907, p. 392. H. G. Wells. W. B. Saunders & Co., Philadelphia.
5. Prepared from Supplement to Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, part ii., 1908. Wyman & Sons, Ltd. (Cd. 2619.)
6. The Sootfall of London. The Lancet, 6th Jan., 1912.
7. Coal Smoke Abatement in England. Dr. Louis Ascher. Journal of Royal Sanitary Institute, Vol. xxviii., 1908, p. 89.
8. Antiquity of Man. Sir Charles Lyell.
9. Origin of the Aryans, p. 181. Dr. Isaac Taylor.
10. The Dale of Grime's Graves and Cissbury Flint Mines. Reginald Smith. Society of Antiquaries, 9th May, 1912.
11. Minutes of Evidence. Royal Commission on Metalliferous Mines and Quarries, Vol. ii., 1914, appendix J., p. 262. Wyman & Sons, Ltd. (Cd. 7477.)
12. Annales D'Hygiène Publique. T. Sixième, p. 10. Benoiton de Chateauneuf, 1831. Paris.

13. Œuvres complètes d'Hippocrate avec le texte Grec en regard, par E. Littré, Vol. 5, 1846, p. 167. J. B. Baillière, Paris.
14. A Treatise of the Diseases of Tradesmen, written in Latin by Bern. Ramazzini, Professor of Physick at Padua, and now done in English by Dr. James, 1705, p. 14. London.
15. Ibid. p. 163.
16. Ibid. p. 30.
17. Ibid. p. 175.
18. Ibid. pp. 170–171.
19. Cui Plinii Secundi, Historiæ, Naturalis, lib. vii., sec. i.
20. Ibid. lib. xxxiii., sec. xl.
21. De Re Metallica, Georgii Agricola, 1557. Froben Basil.
22. Bericht von Bergwerken, durch G. E. Lohneiss, folio, 1690, p. 56. Stockholm und Hamburg.
23. The Staffordshire Potter, by Harold Owen, 1901, p. 276. Grant Richards.
24. Trans. Medic. Chirurg. Soc. Edinburgh, Vol. i., p. 373, 1824. Alison.
25. My Schools and Schoolmasters, Hugh Miller, 1869. Twelfth Edition. William P. Nimmo, Edinburgh.
26. The Effects of Arts, Trades and Professions, C. Turner Thackrah, 1832, Second Edition, p. 99. Baines & Newsom, Leeds.
27. Ibid. p. 90.
28. Ibid. p. 55.
29. Ibid. pp. 85–86.
30. Ibid. p. 80.
31. Ibid. p. 95.
32. La Tuberculose chez les ouvriers en soie. Thèse, Dr. Pierre Givro, 1889. Lyon.
33. Ibid. pp. 141–2.
34. Ibid. pp. 92–3.
35. The Vital Statistics of Sheffield, G. Calvert Holland, 1843, p. 193. Robert Tyas, London.
36. Ibid. p. 196 and p. 201.
37. Report of the Commissioners appointed to inquire into the conditions of Mines in Great Britain, 1864, appendix B., pp. 347–431. Eyre & Spottiswoode.
38. Ibid. p. 3.
39. On Stone-Masons' Phthisis, G. L. Gulland, M.D., March, 1909. Edinburgh Medical Journal.
40. Report on the Health of Cornish Miners, 1904, p. 21. Eyre & Spottiswoode. (Cd. 2091.)
41. Ibid. p. 18.
42. Ibid. p. 20.
43. Ibid. p. 24.
44. Ibid. p. 19.
45. Archiv. fur pathog. Anatom. und Physiol. und fur klin. Medic. von Virchow, Bd. xxxix., p. 442.
46. On French Millstone-makers' Phthisis. Medico Chirurg. Review, Vol. 25, 1860, pp. 214–224, T. B. Peacock. And Trans. Pathol. Soc. London, Vol. xii., 1860, T. B. Peacock, and Ibid., Vol. xvii., 1866.
47. Papers relating to the sanitary state of the people of England, General Board of Health, 1858, p. 132. Eyre & Spottiswoode.
48. Ibid. p. 63.
49. Third Report of the Medical Officer of the Privy Council, 1860, Appendix VI.
50. Ibid. p. 133.
51. Ibid. p. 142.
52. Ibid. pp. 174–5.
53. Ibid. pp. 151–2.
54. Ibid. p. 119.
55. Fourth Report of the Medical Officer of the Privy Council, 1862, Appendix IV. Eyre & Spottiswoode.
56. Ibid. p. 145.
57. Ibid. p. 177.
58. Ibid. p. 159.
59. Ibid. p. 162.
60. Ibid. p. 166.
61. Diseases of Occupation, J. T. Arlidge, 1892, p. 245. Percival & Co.
62. Ibid. p. 297.
63. Ibid. p. 313.
64. Ibid. pp. 298–9.
65. Ibid. p. 252.
66. Effet des poussières industrielles dans la production des affections broncho-pulmonaires, Heim et Agasse-Lafont. Trans. XVIIIth Internat. Congr. of Medic., 1913, sec. xviii., pt. ii.
67. Ibid. Discussion, p. 23.
68. Presse Méd., 1st Sept., 1906, Calmette.
69. Lead Poisoning and Lead Absorption, Legge and Goadby, 1912, p. 102. Edward Arnold.
70. The Industrial Diseases of South Africa, Watkins-Pitchford, 1914. The Med. Journ. of South Africa.
71. Floating Matter of the Air, John Tyndall, 1881, pp. 26–7. Longmans, Green & Co.
72. Ibid., p. 37.
73. The Ash of Silicotic Lungs, John McCrae, 1913. The South African Institute for Medical Research. Hoor & Co., Johannesburg.
74. Diseases of the Organs of Respiration, S. West, Vol. i., 1902. Griffin & Co., Ltd.
75. Ibid. p. 196.
76. Report of Royal Commissioner on pulmonary diseases amongst Miners, 1910, Perth, Western Australia.
77. Ibid. p. 68.
78. Miners' Phthisis at Bendigo, W. Simmons, 1907. Stillwell & Co., Melbourne.
79. Ibid. p. 38.
80. Ibid. p. 35.
81. Flax Mills and Linen Factories, E. H. Osborn, 1894, pp. 18–21. (C.—7287.) Eyre & Spottiswoode.
82. Mr. A. G. Finlaison's Report on Sickness and Mortality, Friendly Societies' Return, 1853, p. xxi.
83. Sickness and Mortality Experience of the I.O.F. Manchester Unity during the Five Years, 1893–1897, 1903, p. 66. Manchester.
84. Annual Report of the Chief Inspector of Factories for 1908, pp. 203–5. Wyman & Sons, Ltd. (Cd. 4664.)
85. Industrial Accidents and Trade Diseases in the United States, F. L. Hoffman. Transactions of the Fifteenth International Congress on Hygiene and Demography, Vol. I., Part ii., pp. 764–769, 1913. Washington.

55. *The Hygienic Aspect of the Coal-mining Industry*, Milroy Lectures, 1914, F. Shuffelboham, lecture iii.
56. *Monographie hygiénique de la fabrication du plâtre en France*, Hébert, Maute, and Heim, 1912. Duruy et Cie., Paris.
57. *Report on the Prevalence of Phthisis among Quarry Workers and Miners*, S. Barwise, 1913. Derby County.
58. *Royal Commission on Metalliferous Mines and Quarries*, Minutes of Evidence, Vol. iii., Appendix P., 1914. Wyman & Sons, Ltd. (Cd. 7478.)
59. *Annual Report of the Chief Inspector of Factories for 1911*, pp. 203-5. Wyman & Sons, Ltd. (Cd. 6239.)
- 59a. *Ibid.* pp. 230-1.
- 59b. *Jahresberichte der Gewerbe-Aussichtsbeamten und Bergbehörden für das Jahr 1911*, pp. 384-419. Berlin.
61. *On the Mortality of Flax Workers*, C. D. Purdon, 1873.
62. *Juste*, H. J. Wilson, *Dangerous Trades*, edited by T. Oliver, 1902, p. 660. John Murray.
63. *An Address on Pneumonia*, Sir James Barr. *British Medical Journal*, Jan. 10th, 1914.
64. *Report to the Royal College of Physicians on the Infectivity of Pulmonary Tuberculosis*. *British Medical Journal*, April 11th, 1914.
65. *The Experimental Production of Pneumonia*, R. B. Armstrong. Supplement to *British Medical Journal*, July 18th, 1914.
66. *The Lumléan Lectures*, Dr. P. Kidd. *Lancet*, Vol. i., 1912.
- 66a. *Ibid.* p. 1590.
- 66b. *Ibid.* p. 1668.
68. *Les Pneumonies à scories*, Monnier. *Gaz. Med. de Nantes*, Nov. 12th, 1898.
69. *Les Pneumonies à scories*, Gautret. *Thèse de Paris*, 1899.
70. *Final Report of Departmental Committee on Certain Miscellaneous Dangerous Trades*, p. 13, 1899. Eyre & Spottiswoode. (C.—9599.)
71. *The Cause, Effect, Incidence and Prevention of Pneumoconiosis of Quartz Miners*, J. S. Purdon. *The Practitioner*, February, 1912.
72. *Miners' Phthisis at Bendigo*, W. Summons, 1907. Stillwell & Co., Melbourne.
73. *Report of the Royal Commissioner on Pulmonary Diseases amongst Miners*, p. 69, 1910. Perth, Western Australia.
74. *Die Staubinhalations-Krankheiten*, Dr. Ludwig Hirt. *Die Krankheiten der Arbeiter*, Erster Theil, Breslau, 1871.
75. *Diseases of the Lungs*, Powell and Hartley, Fourth Edition, 1911. H. K. Lewis, London.
76. *Report of Departmental Committee upon Merionethshire Slate Mines*, 1895. (C.—7692.) Eyre & Spottiswoode.
77. *Minutes of Evidence*, Royal Commission on Metalliferous Mines and Quarries, Vol. iii., 1914, p. 115. Wyman & Sons, Ltd. (Cd. 7478.)
- 77a. *Ibid.* pp. 145-154.
- 77b. *Ibid.* p. 188.
- 77c. *Ibid.* p. 236.
- 77d. *Ibid.* pp. 181-189, and Appendix P.
78. *Recherches expérimentales sur les conditions physiologiques du travail des ouvriers sableurs*, 1911. Briault. *Thèse du Paris*.
79. *Report of Medical Officer of Health for the City of Aberdeen*, 1909, p. 107.
80. *Report on the prevalence of Lung Diseases among the Workers at Grimsill Quarries*, J. Wheatley, 1912. Shrewsbury.
81. *Report of a Commission on Miners' Phthisis and Pulmonary Tuberculosis in South Africa*, 1912, pp. 7-10. Cape Town.
82. *Report of Medical Officer of Health of Johannesburg*, 1st July, 1912, to 30th June, 1913. Charles Porter, M.D., p. 20. Johannesburg.
83. *Transactions of the Pathological Society of London*, Vol. xx., 1869.
- 83a. *Ibid.*, Vol. xvi., 1865, pp. 59-60.
84. *Science from an Easy Chair*, a second series, 1912, Sir Ray Lankester, pp. 191-2. Adlard & Son, London.
85. *Rabelais*, A new translation, W. F. Smith, 1893, Vol. i., chap. xxix., p. 343. Alexander P. Watt.
86. *Die Hygiene des Bergmannes*, Halle, 1903. Goldman.
87. *The so-called Anthracosis and Phthisis in Coal-miners*, R. S. Trotter. *British Medical Journal*, 23rd May, 1903.
88. *The Relation between Anthracosis and Pulmonary Tuberculosis*, by J. M. Wainwright and H. J. Nichols, *American Journal of the Medical Sciences*, 1905, Vol. cxxx., pp. 403-414.
89. *Miners' Phthisis*, Sir T. Oliver, *British Medical Journal*, 12th Sept., 1901.
90. *Weavers' Cough*, Annual Report of the Chief Inspector of Factories for 1913, p. 150. Wyman & Sons, Ltd. (Cd. 7491.)
91. *Diseases of the Lungs from Mechanical Causes*, G. Calvert Holland, 1843, p. 23. John Churchill, London.
- 91a. *Ibid.* pp. 36-7.
- 91b. *Ibid.* p. 60.
92. *Diseases of Occupation*, Sir T. Oliver, p. 294. 1907. Methuen & Co.
93. *Report of Departmental Committee on Compensation for Industrial Diseases*, Minutes of Evidence, pp. 197-202, 1907. (Cd. 3496.) Wyman & Sons, Ltd.
94. *Pneumoconiosis*, Sir T. Oliver. *System of Medicine*, Albutt and Rolleston, Vol. v., 1909, p. 469. Macmillan & Co., Ltd.
- 94a. *Ibid.* p. 462.
95. *Staubinhalation und Staubmetastase*, Julius Arnold, 1885.
96. *Erkrankungen des Respirationsapparates*, E. Aufrecht, Nothnagel's *Specielle Pathologie und Therapie*, Bd. xiv.
97. *La Maladie des Ardoisiers: la Schistose*, Reims, 1900. Imprimerie. Matot-Braine.
98. *Proceedings of Royal Society of Medicine, Electro-Therapeutical Section*, Vol. vi., 1914, pp. 93-98.
99. *Proceedings of Royal Society of Medicine, Pathological Section*, Vol. vii., part iii., 1914, Tubercloid Pneumoconiosis, S. G. Shattock.
100. *The Relation of Industrial and Sanitary Conditions to Pauperism*, Mr. A. D. Maitland and Miss Rose Squire, p. 109, and pp. 123-6, 1909. Wyman & Sons, Ltd. (Cd. 4653.)
101. *Annales de l'Institut Pasteur*, Paris, 1914, xxviii.
102. *Staubinhalationskrankheiten der Lungen*, p. 171, Zenker.
103. *Deutsch. Archiv. für klin. Medic.* Bd. 2, 1867. *Ibid.* pp. 116-172.

THE WORK OF A TUBERCULOSIS DEPARTMENT.*

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THE following paper deals with the work now being carried out at the three tuberculosis dispensaries, situated respectively in the County Borough of Wigan and the Boroughs of Chorley and Leigh, and serving not only these boroughs, but the surrounding townships, comprising altogether a population of nearly 300,000 persons. The staff, in addition to myself, consists of two assistants, five nurses, and two clerks.

I have been fortunate in being allowed considerable freedom in the organisation and management of these dispensaries, and I think that some account of the methods and procedure adopted may perhaps prove of interest.

Although the functions of a tuberculosis dispensary as laid down in the *interim* report of the Inter-departmental Committee in 1912 are fairly definite, there appears to be no little diversity of opinion as to the best means of carrying these recommendations into effect. This is not unnatural when the varying circumstances of the districts concerned, whether urban or rural, are considered. Apart from this, however, there are sharp differences both in theory or practice in areas apparently similar in character.

The tuberculosis dispensary enters into relationship with—

- i. Public Health Department.
- ii. General practitioners.
- iii. The general public.
- iv. Other organisations.

I.—RELATIONSHIP WITH PUBLIC HEALTH DEPARTMENTS.

This should be as intimate and cordial as possible. The problem of tuberculosis is closely associated with questions of housing and sanitation, which are the concern of the medical officer of health. The latter has, moreover, certain statutory obligations under the Tuberculosis Order, 1912. On this account there should be a definite system for the prompt and ready exchange of information between him and the tuberculosis officer. The former receives notifications as to persons suffering from tuberculosis of all forms, and also returns

* Read before a meeting of the North-Western Branch of the Society of Medical Officers of Health on January 15th, 1915.

of deaths. At Wigan such information is transmitted daily from the Health Department as regards cases in the borough, while returns are sent weekly from the county medical officer of health's department. In the latter case there is a certain amount of unavoidable delay, as notifications are first received by the district medical officer, and then transmitted to the county medical officer. To obviate this, arrangements have been made whereby local medical officers transmit to the dispensary duplicates of their returns to the county medical officer. Stamped addressed envelopes are provided, and as a *quid pro quo* a copy of the tuberculosis nurse's report is promptly sent to the district medical officer, who is thus enabled to make use of same for his own purposes.

One of the special tuberculosis nurses visits each case as soon as the notification is received at the dispensary. It is her duty not merely to collect information, but to give advice and assistance in improving the home conditions. She furthermore assists insured persons to fill up the requisite form of application for sanatorium benefit, and, as these forms bear the stamp of the dispensary, the clerks to the insurance committees do not require the customary medical certificate.

In her reports to the senior tuberculosis officer particular attention is paid to sanitary defects, especially lack of ventilation, windows that cannot be opened, etc. After due verification the reports are forwarded to the district medical officer of health, who alone has the power to take effective action in order that these sanitary defects may be remedied. Information is also sent to the Public Health Department when patients are sent to various institutions, in order that the house may be disinfected.

The practice of appointing junior officers to the charge of borough dispensaries at comparatively low salaries is to be deprecated. It is contrary to the recommendations of the Astor Report and the model scheme of the British Medical Association. Medical officers of health, who have the necessary qualifications, are usually far too busy personally to act as consultants; junior officers at lower salaries are seldom acceptable to the local profession, to whom they should prove a help and stimulus. In the case of small boroughs a joint appointment with a neighbouring borough or adjacent county is a convenient arrangement, and finds favour with the Local Government Board.

This is what obtains at Wigan, where it is proving successful. It appears, however, that in many cases the administrative difficulties due to local rivalries are proving a serious obstacle to such joint appointments.

II.—RELATIONSHIP WITH GENERAL PRACTITIONERS.

The first essential is to enlist the support of the local medical profession. This is not a difficult matter when once it is realised that the dispensary exists as a special centre, and is in no way in competition with private practitioners; the latter are usually not slow in realising the advantages to themselves and their patients which result from close co-operation. The dispensary not only affords assistance in diagnosis. It serves also as a clearing-house for cases which are suitable for institutional treatment, is a centre for special forms of treatment, and is actively concerned in the supervision of patients while at home. The relationship of the tuberculosis officer to panel doctors is clearly defined in the Local Government Board Order of July, 1912. The status of the former is that of consultant, and he is, moreover, charged with the general supervision of the domiciliary cases. It is clear that if smooth and harmonious working is to be obtained the machinery must be simple and effective. A telephone at the dispensary makes for ease in communication, and is indispensable. The tuberculosis officers are available at short notice to accompany a practitioner to one of his cases, and doctors are encouraged to send or refer their difficult cases to the dispensaries. It is important that every examination should be considered as a consultation. The patient's doctor always receives due notice as to the time and place, and if unable to be present he receives promptly a statement as to diagnosis and appropriate treatment.

As a result of the above procedure the work of the dispensaries is becoming more and more appreciated both by doctors and patients, and is accomplished with a minimum of friction.

It would appear that in some parts of the country the above state of affairs does not obtain. There are those who hold the view that domiciliary treatment can be more efficiently administered either through or by the dispensary staff alone. In other cases the local practitioners have been allowed to shirk their undoubted legal responsibilities under the Insurance Act. In my view the dispensary

should not seek to supplant, but rather to co-ordinate and supplement, existing agencies.

III.—The general public may be classified as—

- (a) Patients; (c) Suspects;
(b) Contacts; (d) Others.

As regards patients the activity of the dispensaries are available for the whole population, whether insured or not, as the control of these institutions is rightly in the hands of county councils and county boroughs.

The first necessity is early diagnosis. It has been found that, as the dispensaries have become better known, and as the confidence of the general practitioners and the public is secured, cases present themselves for examination at an earlier stage than was formerly the case. In 1914 285 cases were referred to me for diagnosis by general practitioners.

The diagnosis of phthisis in the early stage is often very difficult.

At Wigan reliance is placed on—

- i. Physical examination.
- ii. Slight rise in evening temperature.
- iii. Gradual loss of weight.
- iv. Sputum examination.

Tuberculin and X-Rays have not been used.

Treatment.—It was laid down in the Astor Report that the dispensary should exist as a clearing-house and centre for treatment. Suitable cases are, in fact, drafted off to institutions, e.g., sanatoriums, hospitals, etc., as vacancies occur. As regards cases at home, the view is taken at Wigan that in general the immediate responsibility for domiciliary treatment should devolve upon the panel doctor or other practitioners—at any rate, as far as the provision of drugs is concerned. The Local Government Board Domiciliary Order of July, 1912, is carried into effect as regards insured patients, and blank forms of report with stamped addressed envelopes are sent out to panel doctors as required, usually at intervals of eight weeks. These are timed to refer to a period midway between two examinations. As the treatment of phthisis is essentially a matter of hygiene rather than of therapeutics, the dispensary is very active in the matter of supervision of the patients. The domiciliary reports of panel doctors and the tuberculosis officers' examinations have already been mentioned; in addition, the dispensary nurses visit the homes frequently, usually about once in three weeks, and sometimes oftener. They teach the patients how to record their own temperatures, thermometers and cards being provided from the dispensary. In the majority

of cases the results have been encouraging, and at any rate the moral effect has proved good. Patients who are able to visit the dispensary are encouraged to attend once a fortnight, in order that their weight may be recorded on a card which they keep. Each patient also receives a brief dogmatic leaflet containing the essential rules of treatment. Sputum papers and paper bags are also provided. Tuberculin has been used very sparingly, but would be used more frequently if it could be definitely proved that its advantages were at all commensurate with the risks. The dispensary should certainly act as a centre for special treatment, but must not be allowed to degenerate to the level of an out-patient department or provident dispensary.

Examination of Contacts.—These are invited to be present at visits of the tuberculosis officers to patients' homes, and are examined as far as possible. In the Borough of Wigan the assistant school medical officer is also the assistant tuberculosis officer, and is responsible for the examination of child contacts. It is recognised that in this way early cases may be detected before the advice of the patient's doctor has been sought.

IV.—ASSOCIATION WITH OUTSIDE ORGANISATIONS.

The tuberculosis officer, being the adviser to the insurance committees, a good deal of work is involved in preparing for and attendance at meetings.

The work of the after-care committees is of great importance. These have been successfully established both for Wigan and the county areas. At Wigan alone over ten gallons of milk are being distributed to poor consumptives daily, while nine single bedsteads with bedding are on loan for the isolation of cases who are too poor to obtain these for themselves.

It is unnecessary to do more than allude to the importance of a proper system of full and accurate records of each person examined. This is important both for clinical and statistical purposes.

Patients are, as far as possible, seen by appointment. Intimation is sent by letter to both patient and doctor, and if the latter is not present at the examination a letter is promptly sent to him containing clinical information, together with the treatment recommended. To some this may seem to involve unnecessary labour, but it has been found that the results

have fully justified the trouble taken, both as regards the appreciation of the patients and the increased stimulus given to the doctors.

The importance of a dispensary as an educational centre cannot be over-estimated. In addition to the education of patients, by the staff and through leaflets, a great many lantern lectures have been given throughout my area to large and appreciative audiences, usually under the auspices of the town or district council, with a prominent man as chairman. They have done much to stimulate not only the interest of the public in tuberculosis but also the councils themselves in matters affecting the public health.

CORRESPONDENCE.

The Editor does not accept responsibility for the opinions of correspondents.

To the Editor, PUBLIC HEALTH.

THRIFT IN FOOD SUPPLIES.

SIR,—It is to be hoped that the suggested Committee will co-opt such men as Dr. Harry Campbell and Dr. Sim Wallace, and that the question will be dealt with on philosophical lines, care being taken to subordinate any statement of calorific and nutritive values of food substances to anatomical and physiological principles.

The present increased price of meat is partly due to the fact that more people among the poorer classes consume meat than formerly, through separation allowances putting them into a better financial position than they were ever in before. Though national thrift is incumbent on all, it is well to recollect that these people should not be lectured to eat no more meat than they did before the war. It is good for the nation as a whole that they should eat more meat than the scanty allowances they were hitherto accustomed to; on the other hand, it will be equally good for the nation (and incidentally for individuals) if the more opulent eat less meat than they have been accustomed to.

I would just like to mention one other point. A hygienic disposal of vegetable and animal waste from households will enable potatoes to be grown at no expense or labour beyond that of digging trenches in garden beds for the burying of ordinary scullery refuse, including potato skins. My own experience has been that disposing of fresh scullery refuse in this way several potato plants have sprouted from the eyes in the potato peelings which were buried—surely a thrifty and economical, as well as hygienic, way of obtaining a valuable article of food.

Yours, etc.,

J. T. C. NASH,
County Medical Officer of Health
for Norfolk.

Norwich,
July 3rd, 1915.

SOME REMARKS ON SECOND-HAND CLOTHING AND THE SPREAD OF INFECTIOUS DISEASE.*

By G. W. N. JOSEPH, M.D., D.P.H.,
Medical Officer of Health, Warrington.

EVERY year more evidence seems to be forthcoming limiting the part played by direct aerial conveyance of infectious disease, and proving that infection from person to person or by intermediary "fomites" is almost invariably the rule. The opportunity for the spread of infectious disease, together with certain contagious ones and parasites, cannot be doubted in such businesses as those of dealers in second-hand clothes and bedding. There are more or less four branches of this trade:—

- (1.) Pawnshops.
- (2.) Second-hand clothes shops ("putty" shops).
- (3.) Rag and bone dealers.
- (4.) Buyers of second-hand clothing at private houses. (Although the latter are closely connected with the dealers under the second heading).

The points I am going to bring forward deal largely with the conditions of the pawning of clothing as it is into these that most of my investigations have been made. But what is true for this branch of the business holds good with even greater force for the other classes.

I have nothing whatever to say against the brokers themselves—they have always shown themselves willing to co-operate with the Health Department whenever possible, but the risk of the spread of infection is certainly present in this class of trade and it is to their own advantage, as well as to that of the public at large, that these things should be remedied, if possible.

A very large amount of pawning of clothing goes on regularly amongst the poorer classes in our large industrial towns. Once a family has started the system it is nearly always necessary to continue it.

As a rule it is the best clothes of the household that are pawned on the Monday morning to be redeemed for the week-end or before any special holiday, if funds permit.

Parents often take advantage of the fact that a child is ill to pawn some of the garments quite regardless as to whether the child is suffering or not from an infectious disease.

* Read before the North Western Branch of the Society of Medical Officers of Health on November 20th, 1914.

The clothes when pawned are made up into bundles and packed away on shelves in the shops. Should the pledge be redeemed by the owner and the clothing happens to be infectious, the infection is more or less limited to the original household except in so far as it has contaminated other bundles, but it is otherwise if the pledge is not recovered within the stipulated period. This period is fixed by law at 12 months and a day after which time the articles are forfeited, although it may sometimes be 13 months before they are sold by auction or otherwise disposed of. It is to be remembered, however, that during the whole of this period other bundles pawned for short periods only may be coming in contact with an infected one, and thus be the means of carrying infection to the house.

In most pawnshops one day each week is set apart for the sale of garments which have become forfeited pledges.

The bundles are opened amongst a crowd of women who buy what articles they need and by taking these home may disseminate infection throughout that neighbourhood.

The exact length of time that infection will linger in clothing probably varies for the different diseases, but in some cases has been shown to be considerable. One thing is certain and it is that at the end of 12 months the clothing can be shown to contain living vermin.

It is indeed probable that in some cases where one of the infectious diseases appears to arise *de novo* in a slum area the infection may be traced to second-hand clothes.

One of the first cases brought to my notice was that in which a man had sent his daughter to pawn the skirt and some of the bed-clothes from the bed of his wife, who was lying ill with what ultimately proved to be enteric fever. This woman died, her daughter developed the disease and recovered, but the pawnbroker's assistant who took in the clothing contracted enteric fever and died from the effects of it.

This was a case of undoubted direct infection from the woman to the assistant, but the husband could not be dealt with, as he had at the time no knowledge of the complaint from which his wife was suffering.

Infection from scarlet fever, measles, whooping cough, etc., is much harder to trace, as it is difficult to induce parents to admit dealings with pawnshops.

Sometime ago, when I mentioned some of these points, a deputation of local pawnbrokers

denied that it was possible for these diseases to be spread in this way, and they brought forward statistics to show that there was no more infectious disease in families engaged in this industry than in others, but the majority of these diseases rarely attack adults, and children are not employed in these shops.

Twice in one week a pawnbroker in one of the districts sent word to the Health Department that he had refused to take in bundles from certain families, as he had heard that there was "fever" in the house.

On making inquiries in both cases, infection was found to be present in the child whose clothing had been sent, and in both cases this was the first intimation the Department had had of it. Now, this goes to show two things: first, that the pawnbrokers are careful, and do what they can to co-operate with the Health Department; but it also shows that there is a risk of the spread of disease in this way.

Quite recently two cases have occurred in which it was found by our inspectors that clothing and boots had been pawned after a child had been taken ill with scarlet fever, and before the parent had become aware of the nature of the complaint.

In the case of pulmonary tuberculosis we have very numerous instances of the pawning of personal clothing, etc.

Efforts are made by the staff to induce the patient to obtain a bed and bedding for his own use, if he cannot have a room to himself. With the co-operation of the local Guild of Help, in cases of poverty this bed and bedding has been supplied. We have found, however, that in many instances, sooner or later, the original bedding is pawned, and the patient shares a bed with some other member of the family.

It is no uncommon thing for advanced cases of phthisis to pawn their best clothes before going into the sanatorium. All this occurs without any inquiry as to the possibility of the spread of disease.

Again, it has happened more than once that a mother has evinced surprise on being told by the school nurse that a child's clothing is in a verminous condition, as the parent has stoutly maintained that the clothes were new that day. On further inquiry it has been shown that these clothes were bought at a pawnbroker's sale or at a second-hand shop. What part these vermin may play in carrying infection from person to person has not been definitely settled, but it is indeed possible that

where these insects survive the pabulum is sufficient for maintaining pathogenic organisms of a lower scale.

I think in the case of pawnshops enough has been said to show that there is an ever-present danger of the spread of certain diseases, and that this danger is no small one is evident by the fact that in Warrington one pawnbroker alone states that he deals on the average with 1,000 bundles of clothes per week. Some time ago an agitation was on foot among the pawnbrokers for an alteration of the existing law with regard to the pawning of clothing. They wanted to have the period reduced from twelve months to three months, after which time the article could be sold. One of the reasons advanced was that in twelve months fashions had changed, and so the clothing did not always realise at the sales the amount previously lent on it. If this concession were granted the danger alleged would of course be increased.

In the case of the second-hand clothes shops or "putty" shops clothing of all descriptions is taken in and bought outright from the vendor. A purchaser may go into one of these shops and buy an article of clothing which may have been worn by an infected person on the very same day.

Rag and bone dealers wheeling their carts round the slums collect clothing promiscuously from houses as they go along and sell it again to women in the neighbourhood. This clothing is often filthy, and the persons concerned never have any regard as to whether it may be infected or not.

As to the steps which can be taken to prevent, as far as possible, the spread of epidemic disease in this way, the following points are by no means a solution of the problem, but serve more to emphasise the difficulties of the whole question.

In the first place, Section 126 of the Public Health Act, 1875, prevents the selling and pawning of clothing in cases of infectious disease, but this extends, as a rule, only to the notifiable diseases, and such complaints as measles, whooping cough, chicken-pox and tuberculosis, to say nothing of contagious conditions, such as ringworm and scabies, are left out of account.

Again, this disposal of clothing may take place before the parents are aware the children are suffering from an infectious disease. If this be so it is held there is no legal offence.

As soon as such a disease is notified to the Health Department steps are taken to isolate the case and to disinfect such articles as have been in contact with the patient, but we have only the parents' word for it that the articles of clothing produced are those which the patient was wearing immediately before the onset of the illness.

It has been suggested that a list of all cases of infectious disease occurring in a neighbourhood, with their names and addresses, be furnished to the pawnbrokers, but this would be of little avail for several reasons. A great number of cases of measles, whooping-cough and chicken-pox never come to the notice of the authorities at all, and the same may be said to a smaller extent with regard to other infectious diseases. In addition, it is very seldom that persons furnish their correct names and addresses to the pawnbrokers; and in most districts certain women collect clothing from several houses and pawn them under one name.

It would not be practicable to enforce the disinfection of all clothing before it was pawned. As a rule pawnbrokers insist that bed-clothes and underclothing must be in a cleanly condition, but if it has been merely soaked in water and wrung out again they will generally take it wet as it is. Outer garments of course are not even washed.

However, legislation making it illegal to pawn or sell clothing or bedding that has been used by any sick person, irrespective of the cause of illness, without previous disinfection might be of service.

It should be possible to insist on adequate storage accommodation being provided in the shops for these articles in well-ventilated rooms, each bundle being pigeon-holed, and so more or less prevented from contact with others.

Dust should not be allowed to accumulate. The risks should be pointed out to those engaged in the trade, who should have disinfectant solution supplied for their hands, and no food should be partaken of before the hands are cleansed.

Whether or not any arrangements should be made for disinfecting the bundles before they are opened at the weekly sales, depends a great deal on more accurate knowledge as to the exact length of time infection will linger in clothing. To this end further research is needed into the causation of certain of the infectious diseases.

Finally, in all towns dealers in second-hand clothing and rag-gatherers should be licensed and kept under observation.

Certain regulations could then be enforced, among them being:—

- (1) The prohibition of the sale of under-clothing before it has been washed and boiled.
- (2) Rag-gatherers should be prevented from taking filthy rags from ash-bins.
- (3) These men should not be allowed to take round with them bottles of sweets or other eatables for attracting the children, and which they dispense without in any way cleaning their hands after handling the filthy articles on the hand-cart.

Summary.—The opportunity for the spread of infectious disease by means of second-hand clothing is undoubted, although it is very difficult to obtain any direct evidence, either for or against it.

Further research is necessary, not only into the etiology of some of the infectious diseases, but also into the length of time infection will linger in clothing.

In the case of pawnbroking businesses it is not the brokers themselves who are at fault but the public, and a practicable method of dealing with them would be to make illegal the pawning of clothes in any case of sickness irrespective of the cause, unless the clothing had been previously disinfected.

All such businesses as those of second-hand clothes dealers and rag-gatherers should be licensed in every town, and certain conditions regulating these trades should be laid down.

THE SOCIETY OF MEDICAL OFFICERS OF HEALTH AND THE WAR.

THE following Fellows of the Society of Medical Officers of Health hold Commissions in His Majesty's Forces:—

Lieut.-Col. D. S. Davies, R.A.M.C., T.
 Lieut.-Col. A. E. Jermain, R.A.M.C., T.
 Lieut.-Col. Herbert Jones, R.A.M.C., T.
 Lieut.-Col. Sir Shirley Murphy, R.A.M.C., T.
 Major H. E. Corbin, R.A.M.C.
 Major W. G. Willoughby, R.A.M.C., T.
 Capt. F. J. Allan, R.A.M.C. (on mobilisation).
 Capt. Victor Blake, R.A.M.C.
 Capt. Wm. Butler, R.A.M.C., T.
 Capt. F. G. Caley, R.A.M.C., T., 2nd London Sanitary Company.
 Capt. Reginald Dudfield, R.A.M.C., T.
 Lieut. James Fairley, R.A.M.C.
 Lieut. Thos. Strain, R.A.M.C.T.
 Lieut. J. C. McWalter, R.A.M.C.

(To be Continued).

PROCEEDINGS OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED 1888.
 INCORPORATED 1892.

North-Western Branch.—A meeting was held at the University, Liverpool, on Friday, June 18th, 1915. *Present:* Drs. T. W. H. Garstang, J. W. Talent, J. J. Butterworth, W. Allen Daley, J. H. Wilkinson, W. F. Dearden, T. W. N. Barlow, W. E. Burton, E. Sergeant, Meredith Young, R. S. Marsden, J. Wheatley, A. E. Brindley, C. W. Gee, W. Thomson, W. Wright, A. M. Hewat, W. Hanna, G. Jessel and the hon. secretary. Visitors present were Dr. J. Mc. G. Williams, Mr. Aman, Mr. McCloy; some ladies also came to tea and motor ride. Apologies for inability to be present were received from Professor Delepine, Drs. Fraser, A. J. Young, E. W. Rees Jones, E. L. Lloyd, H. Peck, G. H. Leigh, J. L. Stewart, W. Bishop, and from the following, who were absent on military service—the President (Dr. A. A. Mussen), Drs. Farquharson, Banks, Wynne, Peyton, Hawksley, Dowley and Stallybrass.

It was resolved that Professor E. W. Hope take the chair. Dr. Hope expressed the President's regret at his inevitable absence, and then called upon Professor J. M. Beattie, M.D., to read his paper on "Cancer."

THE CHAIRMAN, in thanking Professor Beattie for his paper, referred to three points:—

- (a) That accuracy in death certification was most essential.
- (b) That good results so far obtained by research were most encouraging.
- (c) That a very wide field was opened up in comparative pathology, whereby the members of the veterinary service could collaborate.

A hearty vote of thanks to Professor Beattie was proposed by Dr. Marsden, seconded by Dr. Garstang, and carried unanimously. In his reply Professor Beattie expressed the pleasure it afforded him to meet the members of the public health service in the North-Western area.

The annual statement of accounts was submitted by Dr. Hitchon, and showed a balance in hand at the end of the year amounting to £6 18s. 7d.

The election of officers for the ensuing session then took place and resulted as follows: *President*, Dr. J. J. Butterworth; *Hon. Treasurer*, Dr. H. I. Hitchon; *Hon. Secretary*, Dr. A. B. McMaster; *Committee*, Drs. Burton, Cates, Daley and Talent; *Council Representatives*, Drs. Butterworth, Hitchon and Wilkinson.

The question of Honorary Fellows was raised at the meeting, and the Secretary was asked to

bring the matter up before the Council in due course.

The retiring President, Dr. A. A. Mussen, entertained the members and visitors to tea after the meeting, after which Dr. Hope arranged for a motor tour to show the recent developments in town-planning round the city.

Southern Branch.—A meeting was held at the Municipal Dispensary, 1, East Park Terrace, Southampton, on Friday, July 2nd, 1915, at 2.30 p.m.

There were present:—Dr. Duncan Forbes (in the chair), Drs. C. W. Hutt, W. G. Willoughby, R. H. Wilshaw, Oscar Holden, James Fenton, E. A. F. Wilkes, H. L. Hamilton, H. W. M. Rees, A. T. Nankivell, W. J. Butcher, J. C. Hoyle, J. L. Livingstone, J. P. Walker, Bartlett, A. Griffith, A. Ashkenny, Lockhart Stephens, R. E. Lauder, R. A. Lyster, A. Mearns Fraser (hon. secretary).

The minutes of the last meeting were read and confirmed.

Letters or telegrams regretting inability to attend were announced from Drs. Stott, Legate and Gibson.

On the proposition of Dr. Fenton, seconded by Dr. Willoughby, it was unanimously resolved that Dr. H. L. Hamilton, assistant medical officer of health to the County Borough of Southampton, be elected President of the Branch for the Session 1915-1916.

The remaining officers of the Branch for the Session 1915-1916 were appointed as follows:—

Hon. Secretary, Dr. A. Mearns Fraser, proposed by Dr. R. E. Lauder, seconded by Dr. Lockhart Stephens.

Hon. Treasurer, Dr. C. W. Hutt, proposed by Dr. Lauder, seconded by Dr. Nankivell.

Representative on Council, Dr. R. E. Lauder, proposed by Dr. Lyster, seconded by Dr. Fenton.

On the next item of the agenda, the appointment of the Branch Council, it was proposed by Dr. Willoughby, seconded by Dr. Hutt, and resolved "that no Branch Council be appointed." A previous amendment to this resolution "that a small committee be appointed to consider the advisability of appointing a Branch Council" was proposed by Dr. Lyster and seconded by Dr. Ashkenny. On being put to the meeting the amendment was lost.

The next item on the agenda, the consideration of the balance sheet, was postponed as the Hon. Treasurer had not been able to present it. Dr. Willoughby explained that Dr. Stott, the hon. treasurer, had been so much occupied by military duties that he had not had time to prepare it.

In connection with the arrangement for meetings during the next session it was proposed by Dr. Lyster, seconded by Dr. Griffith, and resolved

"that the Branch meetings in future be held in duplicate on the same day, one meeting being held in a place convenient to members residing in the eastern district of the Branch, and the other in a place convenient to members residing in the western district.

It was proposed by Dr. Lyster and seconded by Dr. Livingstone "that meetings of the Branch be held on the first Friday of each of the following months—October, November, December, February, March, April, May and June." As an amendment it was proposed by Dr. Fraser and seconded by Dr. Hutt, "that four quarterly meetings be held." On being put to the meeting the amendment was lost. The resolution was then carried.

It was proposed by Dr. Stephens, seconded by Dr. Lauder, and resolved "that the next annual meeting be held at Southampton in June, 1916."

It was proposed by Dr. Hutt and seconded by Dr. Lauder "that any references from the Parent Society be considered at a joint meeting of the Branch." As an amendment it was proposed by Dr. Fraser and seconded by Dr. Livingstone "that in the event of any references to the Branch it be left to the discretion of the President to call a joint meeting where necessary." The amendment was carried.

It was proposed by Dr. Willoughby, seconded by Dr. Stephens, and resolved "that the meeting of the Branch on the first Friday in October at which the Presidential Address is given shall be a joint meeting."

It was proposed by Dr. Ashkenny and seconded by Dr. Lyster "that a permanent executive committee, consisting of the officers of the Branch and three other elected members, be appointed to prepare rules and bye-laws to regulate the work of the two divisions and generally regulate the functions of the Branch without reference to the formation of a Branch Council." As an amendment it was proposed by Dr. Fraser and seconded by Dr. Butcher "that the proceedings of the Branch be governed by the Rules and Bye-Laws of the Society." The amendment was lost and the original resolution was carried.

The following three members were elected members of the above Executive Committee:—
 Drs. Lyster, Wilkes and Livingstone.

Owing to the lateness of the hour the discussion "On the Compulsory Notification of Measles, German Measles and Whooping-cough" did not take place.

The members were hospitality entertained to tea by Dr. Lauder.

Metropolitan Branch.—The annual meeting of this Branch was held on Friday, July 2nd,

at 4.30 p.m., at No. 1, Upper Montague Street, Russell Square, W.C.

Dr. H. R. Kenwood, retiring President, occupied the chair, and, amongst others, there were present, Drs. Bond, Davies, Caldwell Smith, Harris (A. W.), Higgins, Howell, Parkes, Roberts (hon. treasurer), Thomas (D. L.), and Charles Porter (hon. secretary). The chief business was the election of the President and of officers, members of Council, etc., for the Session 1915-16. The various nominations of the Council were accepted, and Dr. J. C. Jackson, medical officer of health, Metropolitan Borough of Fulham, was unanimously elected President.

A special report with regard to the finances of the Branch was submitted by Dr. Roberts, hon. treasurer, and in accordance with a resolution of the Council it was decided to invest a sum of £50, at present on deposit in the new 4½ per cent. War Loan. Before the close of the meeting Dr. Kenwood, from the chair, drew attention to the references in the reports of the Registrar-General to the increase in the infantile mortality-rate, and laid stress on a number of points. A short and interesting discussion, in which all the members present took part, followed.

In the course of the annual report of the Council it was shown that the following, amongst other members of the Branch, had been called up for service or had joined His Majesty's Forces:—

Sir Shirley Murphy, Drs. Kenwood, Caldwell Smith, Bryett, Annis, Sandilands, Dudfield, Butler, Allan (services available on mobilisation), Lennane, Wanklyn, Caley, etc.

Midland Branch.—The annual meeting was held at the Town Hall, Burton-on-Trent, on Thursday, July 1st, 1915, at 12.35 p.m. Present: Dr. Cowie (in the chair), Drs. J. Orton, Ridley Bailey, Reginald W. Stocks, Gibbons Ward, C. R. Wilkins, T. Orr, T. Robinson, Maurice Gepp and E. H. Snell. Apologies for absence were received from Drs. Henry May, Auden, Handford and Millard.

The following officers and Council were elected: President, Dr. Bostock Hill; President-elect, Dr. G. A. Auden; Vice-Presidents: Drs. A. Hill, Henry May, Henry Handford and J. M. Cowie. Council: Drs. S. Barwise, Geo. Reid, P. Boobyer, Henry Malet, John Robertson, Ridley Bailey and Petgrave Johnson. Treasurer, Dr. Bostock Hill. Secretary, Dr. E. H. Snell. Representatives on the Council of the Society: Drs. Ridley Bailey and Henry Handford. Auditor: Dr. J. Orton.

A cordial vote of thanks to the Birmingham Corporation for kindly lending the Branch a committee-room on the occasion of its meetings in Birmingham was unanimously approved.

It was resolved that during the next winter

session only two ordinary meetings (instead of five) should be held, and that these should take place in November and March.

The President (Dr. J. M. Cowie) then entertained the members at lunch at the White Hart Hotel. A visit, of an excessively interesting character, was then paid to the brewery works of Messrs. Bass, Ratcliff & Gretton. The members then had tea at the Town Hall on the invitation of the President; a hearty vote of thanks, proposed by Dr. Ridley Bailey and seconded by Dr. J. Orton, to the President for his kind hospitality terminated the proceedings.

Home Counties Branch.—The annual meeting of the Branch was held at the Town Hall, Edmonton, on Friday, July 2nd, 1915, at 2.30 p.m. The following were present:—The President, Dr. S. C. Lawrence, Drs. Beale Collins, Benton, Laird, Ransome, Warren, Paterson, Sanders, Shannon, Gruggen, Stevens, Tait, Harding, Clarke, Skerret and Dupont. The minutes of the last meeting were read and confirmed. The following officers were elected for the ensuing year:—President, Dr. H. Beale Collins; Hon. Treasurer, Dr. Ashby; Representatives on the Council, Drs. Buchan, Laird and Gruggen; Hon. Sec., Dr. Dupont. On the invitation of the President, Dr. Lawrence, the members then visited the Edmonton sewage works, the "Pegamoid" works, the Eley cartridge factory and the Gothic works of Messrs. Glover and Main. Apart from the extreme interest of the processes of manufacture in the different factories, the permission to visit these works was specially appreciated owing to the fact that a large quantity of war material was in the course of manufacture, and the appreciation of the members was conveyed to the various firms by the President in proposing a vote of thanks after tea, which was provided by the kind hospitality of Messrs. Glover and Main. The unanimous thanks of the members was also accorded to Dr. Lawrence for his trouble and kindness in arranging the meeting.

LAW REPORTS.

COURT OF APPEAL.

April 3rd—5th, 1914.

BEFORE COZENS-HARDY, M.R., BUCKLEY, L.J., AND CHANNELL, J.

HALL v. MANCHESTER CORPORATION.

Housing—Local Act—Closing Order—Unfit for Human Habitation—House in Good Repair.

Under a local Act authorising the local authority to close houses unfit for human habitation, it was held that they were justified in closing houses which were unfit for human habitation merely by reason of the fact that they had not sufficient air space to secure proper ventilation.

This was an appeal from the Vice-Chancellor of the Lancaster Palatine Court. The action was brought to restrain the defendant Corporation from carrying out a closing order made under sect. 41 of the Manchester Corporation Waterworks and Improvement Act, 1867, on the ground that the Corporation were exceeding their powers.

The plaintiff was the owner of three cottages which were said to be unfit for human habitation by reason of the fact that they had only a yard of very small dimensions in their rear, and a path leading to it. Evidence was given at the trial that the yard space was insufficient to secure proper ventilation. No evidence was given that they were otherwise unfit. They had been built in 1860, and had been and were occupied by respectable tenants. Structurally they were in good repair, and the drains were in order.

The Vice-Chancellor granted the injunction, as he considered that the proximity of other buildings could not be taken into account. The Court of Appeal reversed this decision, and dissolved the injunction.

Sect. 41 of the above Act provided that "in any case where it is certified to the Corporation by an inspector of nuisances or by any two medical practitioners that any building or part of a building is unfit for human habitation, the Corporation may by their order . . . declare the same is unfit for human habitation, and shall not, after a date therein to be specified, be inhabited."

COZENS-HARDY, M.R., said that the question, put shortly, was whether the Corporation can make a closing order in respect of a house occupied by human beings on the ground that it is not fit for human habitation, however good the bricks and mortar and the drainage may be, if by reason of something independent of the structure it is unfit for human habitation. He was of opinion that the Act meant a house could be closed if it was unfit for any reason. There was no power to demolish given by the Act, so that the houses could be used for other purposes.

BUCKLEY, L.J., agreed with this conclusion as regards this particular statute, which contained very general words, but was of opinion that the question was a very difficult one. He considered the result would have been otherwise if the words had been less general, such as "is in itself unfit," which are to be found in certain Acts, or "in such a state or condition," which would refer to the structure.

CHANNELL, J., concurred. He thought the words were general, and could not be cut down, and gave the Corporation full power to close the house. As an illustration he suggested a case of a house having windows which were not ancient lights, and the adjoining owner blocking them up so as to deprive the house of all ventilation.

HIGH COURT OF JUSTICE.

CHANCERY DIVISION.

July 8th, 9th, 1914.

BEFORE EVE, J.

JACKSON v. KNUTSFORD URBAN DISTRICT COUNCIL.

Housing Acts—Obstructive Building—Workshop. *The term "building" used in the Housing of the Working Classes Act, 1890, sect. 38, is not confined to a dwelling-house or part thereof. A workshop may, therefore, be dealt with as an obstructive building under that section.*

This was an action to restrain the defendant Council from dealing with a workshop as an obstructive building under the powers contained in the Housing of the Working Classes Act, 1890, sect. 38, as amended by the Housing, Town-Planning, &c., Act, 1909.

The plaintiffs were owners of certain premises, and in the rear thereof was a brick building separated from the other premises and used solely for the purpose of a cycle-maker's and mechanic's workshop. The defendant Council, acting under the above section, made an order for its demolition as an obstructive building. No appeal was made against this order, and the defendants accordingly gave notice to purchase the land and building as provided in the section. The defendants gave notice of their desire to retain the site, but undertook to pull down or allow the defendants to pull down the building on receiving compensation under the Acts. The parties also entered into an agreement limiting the amount of the building which was to be pulled down. As a dispute arose as to the amount of compensation, the defendants gave notice to the plaintiffs that they would apply to the Local Government Board to appoint an arbitrator to assess the compensation under sect. 41 of the Act of 1890.

At this stage the plaintiffs began this action on the ground that the workshop was not a building within the meaning of the section, and that the defendants had therefore exceeded their powers.

The argument was based on sects. 38 and 41 of the Act of 1890. It was contended that this part of the Act only related to dwelling-houses, and that this was made clear by the fact that sect. 41(2) the words used were "in settling the amount of any compensation the estimate of the value of the dwelling-house shall be based," &c. The opening words of sect. 38 also pointed to the same conclusion, because they referred to any building, "although not in itself unfit for human habitation."

EVE, J., dismissed the action. He thought the introductory words of sect. 38 were ambiguous, but from sub-sect. 7 it was clear that they included manufactories and other buildings,

because there was an express provision relating to them. The provisions in sect. 41(2) only related to dwelling-houses when such houses were the subject of compensation. He was also of opinion that the conduct of the plaintiffs in the matter had been such as to debar them from raising the question at this stage. They had agreed that if the defendants would limit the pulling down to a portion of the building they would not object to that portion being treated as an obstructive building.

RECENT PUBLIC HEALTH LITERATURE.

Housing.

HOLROYDE (J.). Housing and the occupier's responsibility. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 45. Discussion, p. 49.—POTTER (T. W.). Cottage building in rural districts. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 38.—SEARLES-WOOD (H. D.). The housing of the agricultural labourer. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 29.—DUNNE (A. B.). Standard of a habitable house in Town and Country. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 61. Discussion, p. 67.

Infants.

KERR (LE G.). The personal factor in infant feeding. *New York Med. Journ.*, 1915, ci, 296.—MUCKLOW (A. E.). A method of feeding infants with precision. *Med. Rec.*, N.Y., 1915, lxxxvii, 295.—ROBERTSON (J.). The special responsibilities of sanitary authorities in regard to infant welfare. *Pediatrics*, 1915, xxvii, 13.—VAN DER BOGERT (F.). Some points on the management of breast-feeding. *Arch. of Pediatrics*, 1915, xxxii, 35.

Infant Feeding.

BERRY (C. W.). Nursing management of breast-fed infants. *Pediatrics*, 1914, xxvi, 583.—DENNETT (R. H.). The use of boiled milk in infant feeding. *Journ. Amer. Med. Assoc.*, 1914, lxii, 1991.—HERDMAN (R.). The feeding of children. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 548.—LADD (M.). Fundamentals in infant feeding. *Cleveland Med. Journ.*, 1914, xiii, 757.—MABBOTT (J. M.). Infant feeding with top milk. *Med. Record*, N.Y., 1914, lxxxvi, 1043.

Infants, Care of.

CHAPIN (H. D.). Are Institutions for infants necessary? *Journ. Amer. Med. Assoc.*, 1915, lxiv, 1.—HESS (A. F.). The neglect to provide for the infant in the anti-tuberculosis programme. *Journ. Amer. Med. Assoc.*, 1914, lxiii, 2176.—KENWOOD (H.). Means and methods of promoting the knowledge of infant hygiene. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 529.—NANKIVELL (A. T.). The care of

children under school age. *Journ. Roy. Sanit. Inst.*, 1914, xxxv, 538.—SYNNOTT (M. J.). The conservation of child life. *Pediatrics*, 1914, xxvi, 648.

Infectious Diseases.

KER (C. B.). Discussion on isolation and quarantine periods in the more common infectious diseases. *Trans. Med. Chir. Socy. of Edinburgh*, 1913-14, xxxiii, 42.

Inoculation, Preventive.

WOODHEAD (G. S.). Preventive inoculation. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 1. Discussion, p. 16.

Insane, Care of.

BANCROFT (C. P.). Some perils confronting State care of the insane. *Boston M. & S. Journ.*, 1915, clxii, 247.

Insanity.

BRILL (A. A.) and KARPAS (A. J.). Insanity among Jews. *Med. Record*, N.Y., 1914, lxxxvi, 576.

Kala Azar.

ARCHIBALD (CAPT. R. G.). A preliminary report on some further investigations on kala azar in the Sudan. *Journ. Roy. Army Med. Corps.*, 1914, xxiii, 479.

Lead Poisoning.

BREINL (A.) and YOUNG (W. J.). The occurrence of lead poisoning amongst North Queensland children. *Ann. of Trop. Med.*, 1914, viii, 575.

Life Assurance.

WRIGHT (A. B.). Heredity and predisposition in life insurance. *Med. Record*, N.Y., 1914, lxxxvi, 958.

Malaria.

HATORE (J.). The anti-malarial campaign in Formosa. *Ann. of Trop. Med.*, 1914, viii, 537.—HODGSON (E. C.). Malaria in the New Province of Delhi. *Indian Journ. Med. Research*, 1914, II, 405.—STOTT (CAPT. H.). Studies in malaria. *Indian Med. Gaz.*, 1914, xlix, 462.—SPENCER (H. A.). Malaria and malarial affections. *Med. Journ. of South Africa*, 1914-15, x, 107.

Measles.

HERRMAN (C.). Measles: Incubation, infectivity, immunity, early manifestations. *Arch. of Pediatrics*, 1914, xxxi, 885.

Meat Inspection.

JONES (E. W. R.). The necessity for central clearing houses for butcher's meat. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 52.

Mortality, Cattle.

HENRY (M.). Mortality amongst cattle in the Bega District of New South Wales. *Veterinary Journ.*, 1915, lxxi, 62.

Public Health

THE JOURNAL OF

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THE PUBLIC HEALTH SERVICE.

OUR current number contains a series of articles bearing on the work and the necessary qualification of health officers. In this term we include not only those who are engaged in the ordinary work of the medical officer of health, but those employed in the allied branches of administration, which deal with the care of the health of school children, the more specialised work relating to their eyes and teeth, the duties of the tuberculosis officer, and the functions of the veterinary surgeon so far as they relate to the prevention of human disease.

In his article on the training of the medical officer of health, Professor Kenwood properly points out that the termination of the war will be attended by increased demand for public health services owing to the need for compensating for the serious losses borne by the effective male population. Human life will undoubtedly have a higher value than before, and the medical officer of health will be looked to for the prevention of any mortality which can be brought under administrative control.

With this demand, and we will hope with a willingness on the part of the public to incur expenditure with the object of increasing the human stock, there will be less public money available for expenditure on objects which cannot be shown to be necessities. In this conflict there is sure to be critical inquiry into the actual value of various administrative procedures aiming at the reduction of mortality and disease, and it may be expected as a result that some modification may be made in respect of the duties which are now undertaken by public health authorities.

We may anticipate that effort will be made to proportion more exactly the decline in mortality which is a purely natural phenomenon and that which is due to administrative effort. There is nothing easier than to draw inferences from coincidences between the behaviour of death-rates and some attendant circumstances. The alleged increase of cancer and of the use of

tomatoes is a familiar instance of this method of reasoning. The development of administration involving expenditure of public money, if based upon a questionable hypothesis, has less prospect of remaining unchallenged in the future than in the past.

Professor Kenwood has before drawn attention to the increasing demand which the developing subject of public health makes upon teachers and students, and recurs to this question in our present number. We would wish to see this subject of the natural behaviour of disease receiving more attention than it always does. Medical officers of health are the responsible advisers of their authorities as to expenditure on administration, and it is necessary that they should be able to form independent judgment of the relative value of administrative measures and not merely be guided by public or other opinion, which may not have a solid foundation.

The medical officer of health must, indeed, always be a student, and should be mentally trained to weigh and sift evidence in all matters with which he is concerned. He should be educated for this purpose. He must, moreover, be carefully trained in the actual executive work which devolves upon him when he is in office. The time which is allotted to him for learning the method of applying the public health law and the investigation of disease occurrences is all too short. A more extended programme of pupillage is undoubtedly needed. Whether this will be attainable under the conditions which will exist in the future it is impossible yet to foresee.

There is probability that some administration will go into the melting-pot as the result of the present war. If so, there will necessarily be review of the past and the development of that which is found to be sound. It is well that we should all carefully consider the prospect which lies before us in order that the medical officer of health of the future may be fully educated and fitted to undertake the duties which will devolve upon him.

THE TRAINING OF THE MEDICAL OFFICER OF HEALTH.

By PROF. H. R. KENWOOD.

WITH our Empire engaged in a fight for its existence, it is right that we should consecrate our manhood and energies to the more pressing national demands of the time. It is inevitable, therefore, that post-graduate medical work must suffer; indeed, we could not wish to see large numbers of able-bodied men devoting themselves to this work when a higher duty and ambition calls them elsewhere. Hence it follows that for the past twelve months the training classes for the Diploma in Public Health have been but skeletons of their former selves; a skeletal class has been administered to by a skeletal staff, and nothing but skeletal examinations have been held. Teachers and students alike have found it difficult to concentrate their minds upon the work; khaki has entered our laboratories; and "special editions" have penetrated our scientific fastnesses, and have actually been seen spread upon our working benches. Now, the effect of all this is a falling-off not only in the amount, but also in the quality of an important branch of post-graduate work. This is, of course, but temporary, and matters will quickly readjust themselves after the war; and in the meantime the difficult and costly work of maintaining skeletal classes in war-time must be conducted on the "business-as-usual" lines—not because we agree with that as a general policy, but because it is of national importance that every man and woman desiring public health training should continue to receive it.

No shortage of trained medical public health workers has yet made itself felt in this country, for, although the ranks of the civil workers have been seriously depleted to meet military demands, it has been possible to carry on the public health services of the country satisfactorily without serious difficulties. Some forebodings of an increased prevalence of disease among the civil population have not been realised; and the general health of the population at home has, despite some privations, the influx of poor refugees, and the heavy billeting of many communities, remained quite good up to the present. For this we are thankful; and it is a source of great satisfaction that there have been so many well-qualified sanitarians both able and willing to

undertake military services. Happily, the services demanded are not of a nature which involve great risk to life, and so it is unlikely that the nation's available supply of trained sanitary workers will be seriously reduced when peace returns to us.

It is certain that after the war is over there will be an increased demand for public health services, for both Parliament and the public are increasingly realising the need for redoubled energies in the direction of conserving human health and life, and of thus restoring to the population the heavy losses borne by the effective male population. It is, therefore, to be expected that with peace we shall witness an increase in the numbers of those desiring to train for the Diploma in Public Health; and it is to be hoped that it may be possible to somewhat modify the existing scheme of training and to attune it better to the needs of the future medical officer of health, in the light of recent developments in public health activities. In last year's September issue of PUBLIC HEALTH I drew attention to the increasing demand which the rapidly-developing subject of public health makes upon teachers and students, and the danger involved in attempting to cover an unnecessarily wide field of work within the period of study required by the Regulations of the General Medical Council. For the average worker will not devote additional time to D.P.H. work; indeed, the sacrifices of time and money involved in complying with the Regulations deter large numbers from undertaking such work at all, for public health appointments are difficult to obtain, and the remuneration offered is less attractive now that medical services are, generally speaking, better paid. (Surely public health effort, which gives so much to the community, may fairly demand a better scale of remuneration!) In last year's article I expressed the view that, having regard to the limitation as to time and opportunities of both the teachers and the taught and the ever-widening scope of matter to be studied, a sound, practical knowledge of certain essentials should not be prejudiced by the introduction of matters of little or no practical importance. I indicated, for instance, how the practical chemical work could be reduced in scope without loss. An expert knowledge of water analysis and of other essential items could be demanded if much that is now taught of the analysis of food were dropped; then there would be an end of what

is my common experience, as an examiner at several centres, of candidates so trained that they are better able to distinguish between butter-fat and other fats than to obtain fairly accurate results and to form a correct judgment thereon in respect of water analysis. I would further suggest, as some relief to the large amount of matter which the D.P.H. student is required to memorise, that he should be permitted (as in most examinations for chemical degrees) to consult his notes at the practical examination. If I refer again to this subject, it is because my experience confirms me in the belief that reforms on these lines are necessary and inevitable, and so the sooner they are put into operation the better. But let me furnish one other illustration of how the present burden may be lightened, by taking the subject of sanitary law—that bugbear of the D.P.H. student. I recall that I was much impressed at the time by the large amount of detail of sanitary law which I had to memorise, for the purpose of my D.P.H. examination over and above the facts which bore directly upon the duties of a medical officer of health, whose work I had followed for six months as part of my training; and when shortly afterwards I obtained an appointment I found the clerk to the local authority (one who had, in addition to his legal training as a solicitor, fifteen years of official experience) unable to confirm me on points in public health legislation until he had looked the matters up. I then asked myself whether all that I had committed to memory with such difficulty was really necessary, and, if not, whether it was *desirable*, if my knowledge of more essential matters suffered (as it certainly did) by consequence. The official medical officer of health is not the legal adviser to the sanitary authority any more than he is the public analyst; and if it were required of him to act in either capacity his D.P.H. training would be ludicrously inadequate to his needs, having regard to the time he is asked, and which he is prepared, to devote to his training. The details of sanitary law as now crammed up are the first matters to be forgotten after the examination, and a general impression of powers is all that remains. A considerable amount of study would be set free for other more important work if a knowledge of sanitary law in general outline was required, omitting details save in respect to a few selected items.

Our training must also adjust itself better to the changing demands of such an

evolutionary subject as public health work. As our outlook upon the needs of the community changes its perspective, we must lighten our labours on some branches of our subject, so as to concentrate more on other branches which have grown into prominence, and are claiming more and more of official energies. Take, for instance, the subject of the preservation and development of child-life, linked, as it must be, with the study of associated social problems; this demands a much more extended study than has hitherto been given to it by the D.P.H. student. It is a subject the prime importance of which everyone now realises, and it is one which is destined to appeal even more strongly after the great war has fully claimed its toll of life. The medical officer of health will figure prominently in connection with this difficult branch of work, and ought we to prejudice his ability to do so by directing his energies while in training to the acquisition of unimportant knowledge and the cramming of facts with which he has no need to burden his memory?

Of course this evolution in public health effort is recognised, and finds expression in an improved teaching and better text-books, but the dead hand of tradition still rests too heavily upon our training courses and examinations. While this is so progress is hindered, for the reason that teachers and candidates must necessarily adapt their work very largely to the requirements of the examination which shall determine the possession of the qualifying diploma. Some readers will recollect that for many years a stock item in the practical chemistry examination was the detection of the nature of three gases placed in separate air-jars. Who originated it I do not know; nor can I conjecture any motive for it, as it seems to me to have no practical application. Yet it survived as a part of most D.P.H. examinations for many years. This circumstance shows how difficult is the process of departing from tradition; but examinations are now conducted on greatly improved lines, and so we may hope that the not distant future may see further improvements in several directions. It is not suggested that the training of a D.P.H. student should be made more easy, but rather that we should make the knowledge of the D.P.H. student of the more essential matters less superficial than it is, and thus increase the practical value of his training. More particularly is it desirable to relieve him from the strain of committing to memory much that a

skilled chemist or bacteriologist or lawyer would consult the book upon.

If I have devoted this article to a plea for the better training of the D.P.H. student, I have done so because I realise that both from the standpoint of the teacher and taught some reforms are called for, and this fact has been emphasised by the special difficulties of the past year. All medical officers of health are interested in the training of those who may be called upon to assist them or to succeed them, apart from their general concern for the efficiency and success of the service they represent, and a considerable proportion of medical officers of health take some part in such training. Therefore, our Society might succeed in obtaining some useful results if, when the war is over, it appointed a special committee to deliberate upon this subject, and to report to them; and any representations which the Society thought fit to make to the chief training and examination centres could not fail to receive every consideration.

THE SOCIETY OF MEDICAL OFFICERS OF HEALTH AND THE WAR.

THE following Fellows of the Society of Medical Officers of Health hold Commissions in His Majesty's Forces:—

Lieut.-Col. D. S. Davies, R.A.M.C., T.
 Lieut.-Col. M. Hay, R.A.M.C., T. (on mobilisation).
 Lieut.-Col. A. E. Jerman, R.A.M.C., T.
 Lieut.-Col. Herbert Jones, R.A.M.C., T.
 Lieut.-Col. Sir Shirley Murphy, R.A.M.C., T.
 Major C. S. Brebner, R.A.M.C.
 Major H. E. Corbin, R.A.M.C.
 Major J. H. P. Graham, R.A.M.C. (S.R.), B.E.F., France, 1914-5.
 Major W. G. Hamilton, I.M.S., o/c Medical Division, Bombay Presidency War Hospital, Alexandria.
 Major H. Handford, R.A.M.C., T., Divisional Sanitary Officer 33rd Division, and Assistant Specialist Sanitary Officer to Northern Command.
 Major W. G. Willoughby, R.A.M.C., T.
 Capt. F. J. Allan, R.A.M.C. (on mobilisation).
 Capt. Victor Blake, R.A.M.C.
 Capt. Wm. Butler, R.A.M.C., T.
 Capt. F. G. Caley, R.A.M.C., T., 2nd London Sanitary Company.
 Capt. Reginald Dudfield, R.A.M.C., T.
 Lieut. W. H. Davison, R.A.M.C., T., o/c 2-1 Sanitary Section, South Mid. Division, T.F.
 Lieut. James Fairley, R.A.M.C.
 Lieut. H. Holroyd, R.A.M.C., o/c 31st Section, 1st London Sanitary Corps.
 Lieut. Percy W. Kent, R.A.M.C., T.
 Lieut. Bernard Shaw, R.A.M.C., T., 2nd Welsh Field Ambulance.
 Lieut. Thos. Strain, R.A.M.C., T.
 Lieut. J. C. McWalter, R.A.M.C.
 Lieut. Adam White, R.A.M.C., T., o/c Sanitary Section, 59th Division.

(To be Continued.)

THE SCHOOL MEDICAL SERVICE.

THE School Medical Service has been attracting into its ranks an increasing number of the younger members of the medical profession during the past few years. The number of school medical officers and assistant school medical officers giving their whole time to the public service increased during the years 1910 to 1913 from 235 to 554, and is still increasing. To the young man or woman recently qualified, this branch of public work probably offers better immediate remuneration than do most activities of the medical profession; junior appointments, moreover, are obtainable without great difficulty, the supply of capable young practitioners being considerably less than the demand for their services.

It is, however, important for anyone who contemplates undertaking school medical work to realise that the number of responsible and well-paid appointments is comparatively small, and that his ultimate prospects will largely depend upon the extent to which he is able to look forward, and to qualify himself for undertaking the larger responsibilities of senior and administrative posts. It may be of assistance to such persons, of either sex, to consider briefly, first the qualifications and special experience desirable for such appointments; secondly, the character of the work involved; and, finally, the remuneration and future prospects.

In the first place, then, it must be remembered that, with the approval of the central Authorities, school medical work is in almost every area closely linked up with the public health service, and the higher administrative posts of the two services are, as a rule, combined under one head. For this reason it is almost essential that those entering on school work should obtain the Diploma of Public Health; otherwise they will almost certainly be debarred from obtaining any of the better paid appointments. The nature of the work further renders it desirable that special experience should be obtained of ophthalmic work, and, if possible, also of X-Ray work in the treatment of ringworm. In many areas these forms of treatment are undertaken by the staff of the School Medical Service; in other areas, where specialists are employed, the school medical officer is responsible in a supervisory capacity for the adequacy

of such treatment. It may be added that experience gained in special hospitals for children is of great value in school medical work.

In regard to the *character of the work*, it may be noted that in most districts the school medical staff constitutes also the medical staff of the health department, the proportion of time devoted to school work varying with the district and with the size of the staff. Perhaps the most usual arrangement is that by which the assistant school medical officer acts on occasion as assistant and deputy to the medical officer of health, but gives the bulk of his time to medical work connected with the schools. In some districts, however, particularly in some of the larger towns and in counties, the assistants give their whole time to school work.

This work consists, in every area, of the carrying out of medical inspection, with work arising from this—re-inspection and supervision of children suffering from physical ailments, the control of infectious and contagious conditions affecting school children; examining and reporting on "school attendance" cases and other special cases referred for an opinion; and inspecting and reporting on the hygienic condition of school buildings. The statutory requirements necessitate the routine medical inspection of children on admission to school, and subsequently at the ages of eight and twelve years; about one-third of the children in attendance at school will thus require inspection annually. In an urban area, with a school population of 8,000 to 9,000, this routine work, with the examination of special cases and the other activities mentioned above, will occupy not less than half the time of a medical officer. In country districts, with long distances to be covered, a proportionately longer time will be taken up.

In districts where medical treatment is undertaken by the education authority (and these now constitute the large majority) the school medical officers are responsible for seeing that this is adequately carried out, and may be required themselves to undertake the treatment of certain defects. Minor skin diseases, sore eyes, running ears, and kindred conditions are usually dealt with by nurses acting under the instructions of the school medical officer. In many areas refraction work and the administration of anæsthetics, in a few the treatment of ringworm by X-Rays and the performance of operations for enlarged tonsils and adenoids are deputed

to the staff of the School Medical Service.

In addition to these duties the school medical officer has special responsibilities connected with physically and mentally defective children. In regard to the latter he is generally responsible for examining and classifying the children for the purposes of the Mental Deficiency Act; if open-air or other special schools are maintained by the education authority, supervision over the mental and physical progress of the children devolves upon him. If the Provision of Meals Act is in force he is responsible for seeing that adequate meals are provided, for the selection in special cases of children requiring to be fed, and for estimating the effects of the meals upon the health of the children.

In districts where there is more than one medical officer the greater part of the routine and clinical work as a rule devolves upon the junior members of the staff, the school medical officer himself being responsible for the organisation and administrative arrangements. As the latter is usually also medical officer of health, often but a relatively small proportion of his time is given to the school work; but in regard to this the custom varies considerably in different areas, and it is not very unusual to find the head of the department devoting a considerable time to clinical work.

The remuneration of assistant school medical officers ranges as a general rule between £250 and £400 per annum; only in exceptional cases does the salary rise above the latter sum; travelling expenses are, of course, allowed in addition, and if special forms of treatment are undertaken by the medical staff, fees may be (but are not always) allowed for such work. The prospect of obtaining a senior appointment which is almost invariably combined with the public health appointment, depends very largely upon the gaining of experience in public health work. For this reason the assistant school medical officer should wherever possible be also assistant medical officer of health, and should take every opportunity of gaining practical experience of public health work. It need hardly be said that competition is keen in respect of senior administrative appointments. In the few instances where the school medical officership is a separate and distinct post, the salary is not, as a rule, attractive if regarded as a permanency, nor, for the reasons stated, are the prospects of obtaining one of the better paid appointments satisfactory.—H.C.T.L.

THE TUBERCULOSIS OFFICER.

By J. EDWARD SQUIRE, C.B., M.D., F.R.C.P.,
Medical Adviser to the London Insurance Committee.

THE Tuberculosis Officer is a medical officer appointed to carry out preventive measures against tuberculosis and the treatment of this disease under a scheme organised in each district by the local health authority and approved by the Local Government Board.

The scheme is to be based on the Report of the Departmental Committee on Tuberculosis, known as the Astor Committee, which recommends that for the prevention, detection and treatment of the disease, existing public health administration should be supplemented by the establishment and equipment of two units—(1) the tuberculosis dispensary and (2) institutions for in-patient treatment.

With such a scheme, and as part of it, the National Insurance Act is included for the purposes of sanatorium benefit. The tuberculosis officer is, therefore, an official of the sanitary authority, who, unlike the medical officer of health, is concerned with the treatment of patients as well as with preventive measures, and whose activities are restricted to the prevention and treatment of one specified disease.

According to the recommendation of the Astor Committee the centre of his special work is the tuberculosis dispensary, and in most districts the tuberculosis officer is the medical officer of this unit. In any case where a tuberculosis dispensary, by whatever body it may have been established, is "approved" by the Local Government Board, the medical officer of this institution becomes *ex-officio* a tuberculosis officer of the district served by the dispensary.

The duties of the tuberculosis officer necessitate intimate relationship with the medical officer of health, with the general medical practitioners of the district, and with the medical officers of sanatoria, hospitals, etc. He should also be prepared to act as medical adviser to the Insurance Committee for purposes of sanatorium benefits. "He should decide as to the suitability of patients for the sanatorium, the hospital for advanced cases, etc., in co-operation, as far as possible, with the general practitioner 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." *L.G.Bd. Circular dated 6th July, 1912.*

He will thus have to work with more than one authority, and may have to carry out instructions issued by bodies which did not appoint him, and cannot remove him. He will have to advise patients who are under the treatment of other practitioners, and to some extent must supervise and possibly criticise the recommendations of these practitioners. All this necessitates the exercise of tact and demands special knowledge—the tuberculosis officer must be an "expert," able to speak with authority on his special subject.

It will be evident that the ideal tuberculosis officer may not be easy to find. Nevertheless it is well to realise the qualities and attributes which are desirable for such a position, and, if all the requirements of a perfect tuberculosis officer are not to be had, some at least must be insisted upon.

The tuberculosis officer should be essentially a clinician, though he should have some knowledge of public health. He should possess both knowledge and experience of general medicine, and special knowledge of chest diseases. He should have practical acquaintance with surgical tuberculosis, and a sufficient knowledge of other surgical diseases which may give rise to similar signs and symptoms to those of tuberculosis to enable him to discriminate between them. He should have practical experience of sanatorium work, so that he may know what class of cases may be expected to benefit by residence in such institutions. He should know the working of a tuberculosis dispensary—the keeping of medical records as well as the treatment and home visiting of patients. He should know the method of administering tuberculin, the proper dilution and dosage, and the means of measuring or estimating its effects. With these purely professional qualifications he must possess a good measure of tact, for he will be brought into official contact with people of different classes, with different temperaments, and often with conflicting interests. A knowledge of the world and an acquaintance with the characteristics and susceptibilities of the class from which the insured are chiefly drawn are also useful.

It is evident that, though many of the requirements enumerated above can be attained in the course of the usual medical curriculum followed by a year or two of special training in

a chest hospital or sanatorium, others are only attainable by the experience of many years. The ideal tuberculosis officer may not, therefore, be found amongst candidates for first appointments to the office.

For first appointments the essentials may be reduced to a good knowledge of general medicine and surgery, some acquaintance with the principles of public health, some special experience of chest diseases—especially in the diagnosis and treatment of pulmonary tuberculosis—and a period of residence in a sanatorium.

A good knowledge of general medicine is essential. The specialist who is a specialist above all tends to look on all who consult him as being probable sufferers from the disease on which he has specialised. The tuberculosis officer should rather examine his patient with a scepticism as to the presence of tuberculosis, or at the least should keep an open mind as to the possibility of some other cause for the symptoms—he should, as it were, only allow himself to arrive at a diagnosis of tuberculosis by the method of exclusion. It must be borne in mind that most of the patients the tuberculosis officer has to examine come to him with a presumption that they are tuberculous. Either the individual or his friends have a suspicion that he is suffering from consumption and the history of the case which is given will be biased and coloured by this suspicion, or the patient comes with a diagnosis of tuberculosis from his doctor. If the tuberculosis officer allows himself to be over-impressed by this presumption he may find sufficient confirmation in signs and symptoms where a fuller examination would disclose some unexpected disease as the cause of the illness. It is sufficient to instance malignant disease of the lung as a case in point, though many examples of mistaken diagnosis will readily occur to the experienced.

Special experience in chest work is a requirement which will be obvious to all who know the difficulties in detecting and interpreting the physical signs of early tuberculosis in the lungs.

Some practical experience in a sanatorium is necessary in deciding what cases should be sent to such an institution. The tuberculosis officer will find that most of the applicants for sanatorium benefit under the National Insurance Act expect to be sent to a sanatorium, and that most of the cases sent by medical practitioners are recommended by the doctor

for sanatorium admission. If the tuberculosis officer, from want of personal experience to guide him in a selection, accepts all recommendations made to him, he will soon find his available beds occupied by chronics who make no perceptible progress.

As the tuberculosis officer will possibly be also the superintendent of the tuberculosis dispensary, a personal acquaintance with the organisation and working of such institutions will be helpful; experience gained in a sanatorium is, however, more generally useful than experience gained in a tuberculosis dispensary.

Some knowledge of public health is important in connection with the preventive side of tuberculosis work, but it should not be forgotten that the work of the tuberculosis officer is primarily clinical. The preventive side of the work belongs more particularly to the public health administration. The tuberculosis officer has to consider first the welfare of the tuberculous individual: the medical officer of health is responsible for the welfare of the community and the possible influence of the tuberculous individual on the health of his neighbours. The medical officer of health will necessarily seek the co-operation of the tuberculosis officer in this connection, but the interest of the individual sufferer should prevent the tuberculosis officer being a mere subordinate of the public health administration. This is more particularly important in the dealings of the tuberculosis officer with the insured person, whose contributions under the Act are for his personal benefit.

It is obvious that a course of lectures on "Tuberculosis, its Prevention and Treatment," and a three months' course at a tuberculosis dispensary cannot be considered as an adequate training for the post of tuberculosis officer: to the man who has been medical officer at a well-organised sanatorium—especially as subordinate to an expert superintendent—such a short course will be most useful in fitting him for appointment.

OBITUARY.

We much regret to have to announce the death of Dr. Ralph William Johnstone, Medical Inspector of the Local Government Board, which has occurred while we are going to press. We propose to give some account of his life and work in our next number.

We much regret to announce the death of Dr. Thomas Glover Lyon, an old and valued member of the Society of Medical Officers of Health.

POST-GRADUATE TRAINING IN EYE-WORK FOR THE SCHOOL MEDICAL OFFICER.

By N. BISHOP HARMAN, M.A., M.B., F.R.C.S.,
Vice-Dean of the West London Post-Graduate College
and Lecturer in Ophthalmology.

THIS article has been headed with the word "Post-Graduate," and for a very good reason. The work of the medical undergraduate is now so extensive, and the subjects with which he has to familiarise himself so elaborate, that he has barely time in which to get a working knowledge of the nomenclature associated with these several subjects, much less has he time to secure a concrete attachment to the real matter that underlies all this terminology. It is therefore inevitable that those subjects which can only be learned with a maximum of practical work will suffer some sort of neglect at the hands of the overworked undergraduate. This is exactly what happens to the study of eye-work. It is essentially a practical subject, very little can be learned of it from the mere cramming of text-books, the very best and most lucid explanation of any ocular phenomenon or disease symptom can scarcely be grasped without the demonstration of the condition upon the living subject, and the very methods of examination upon which the determination of these conditions rely can only be mastered by long and assiduous practice. If the undergraduate has learned the significance of inflamed eyes coming on at the third day of an infant's life, he has gained something; if he has learned to differentiate between the symptoms of conjunctivitis, iritis, and glaucoma, he has learned much more; and he is safe to be granted a diploma to practise on his fellow-citizens. But for all this invaluable knowledge he cannot hope to tackle the problem of the eyes of school children, the appreciation of that is essentially a matter for post-graduate study.

Eye-work amongst school children may be divided into three main groups. 1. The recognition of external diseases; 2. The recognition of functional disorders; 3. A knowledge of the hygiene of the eye. The importance of the three conditions vary according to the status of the population. In the East the first of these is by far the more important of the groups. In Egypt the greater part of the time of the school medical officer is absorbed in combatting the spread of the trachoma. In this country the better sanitary condition of

the people make this particular disease very rare, and even the milder types of external diseases are less common than are the functional disorders arising out of the constant use in near work of eyes that are congenitally handicapped by anatomical conditions. The time that the school doctor of Egypt devotes to the cure of trachoma is spent by the British school doctor in testing the vision of the children and arranging for the correction of suspected errors of refraction. Again, with the recognition of the ill-effects of much of the work pressed upon the children, especially upon those whose eyes work at a disadvantage owing to these errors of refraction, there has been a change in the stress of the school doctor's work. He is becoming more a hygienist. He is keen on the work of the child, and the conditions under which it is done; and this opens up a line of advance of the greatest interest. For this new line follows out such matters as architecture, illumination, books, paper, printing, desks, posture at work, duration of work, methods of handwriting, styles of drawing, the teaching of sewing—in fact, the list grows so long that one may fairly say that it covers the whole curriculum of the school child.

Where is the aspiring post-graduate to learn all these things? For a school medical officer a diploma in sanitary science is recommended with good reason, but there is no scheme of instruction for such a diploma that even touches such subjects as these. At the present it must be confessed that there is no one and complete scheme of study formulated for this work. The man who is intent on mastering them must be eclectic, he must attach himself to some medical school or special hospital where he can see cases of eye disease, and have the opportunity for carrying on investigation in the refractive errors of the eye. The practical application of this work to the children he will have to make for himself, and if he has the good fortune to be attached to some elementary school during this period of study he will have no difficulty in correcting the impressions he gains at the hospital of the incidence of eye disease by a constant reference to the conditions actually existing amongst the children. I would lay particular stress upon this correlation of the work of hospital and school. Too many of our men when they start work are so obsessed with the state of the patients they see in hospital that they are inclined to consider them a fair sample of the population. Happily this is not so. The

mass of the children are very fair specimens of humanity, despite the high percentage of "defects" that are reported in blue books and elsewhere.

The mastery of the art of retinoscopy, without which it is impossible to do any systematic work amongst children, must lie for the most part within the hands of the student himself. Retinoscopy is at the same time one of the most difficult of arts and yet most easy. It is difficult because no man can see the reflex upon which this practice rests at the same time as his teacher describes it to him. Each must take his turn and one must rely upon the correct description of the other, or else look and learn for himself. The latter is by far the better practice. The man who has made his observation for himself has done something original, and he has made a secure possession. A great deal of the difficulty experienced by beginners is due to the bad practice of the text-books, of which there are a host, in slavishly following the original description of retinoscopy. Cuignet, who discovered the art, was impressed by the black shadow across the light reflex, he saw this in gross cases of error, and in such states it is a prominent feature. But the vast majority of the cases to be examined are but little removed from the normal, and in these the "shadow" is hard to seek, and elusive to the last degree. If the beginner will boldly look at the light emerging from the eye, and consider it and its movements just as he would the movements of a signal lantern waved by a railway man, he would have no difficulty in mastering the principles of the art. The rest lies in assiduous practice. The serious man will be content with one or two cases for a morning's work. He will test the eye subjectively, then retinoscopy without a mydriatic, again with homatropine and cocaine, and then on another session under atropine, and repeat the subjective examination. He will note each result, and lastly sit down to study them and see what differences he gets under the several states. Such study will give him a security that no hurried survey can.

The study of the hygiene of the eye. This is truly a matter for the exhibition of glorified commonsense. I strongly recommend the student to start this work by visiting a number of schools, both old and new. Let him take an ancient public school, some of the earliest board schools, and then some of the recent council schools. Let him write a

critical review on the plan of the buildings, the class rooms, the set or position of the windows, their aspect, their relation to the floor space. Next let him do the same for artificial illumination, making his examination at dark by measuring the light with a photometer. Desks, school material, and methods of work should all come under a similar review. He should write out his observations, giving plans or drawings and where possible collecting samples of work, and the whole should be set out in such a manner that an intelligent layman could understand all. If he can get such an one to criticise his observations, so much the better. When he has done this "pioneering" work for a few weeks he should begin to read. There is no text-book to turn to, he must search the files of blue books, London County Council orange books, "Public Health," "School Hygiene," the reports of the Society of Illuminating Engineers, of the British Association Committees. To the novice such discursive reading is impossible, but to one who has made a practical essay into the work, and exercised his primitive and unbiased wits on the matter, such reading will be invaluable. There is no branch of work which enhances the value and dignity of the school medical officer's position than does this. From a mere hack he develops into a judge of the court of final appeal in all matters relating to the school work of the child.

PRINCIPLES AND METHODS OF INDUSTRIAL CONTROL.

AN industry is responsible for the conditions existing in its establishments.

It is the duty of an industry to take care of and to improve the sanitary conditions of its factories and workshops.

Good sanitary conditions of industrial establishments are a debt which the manufacturers in an industry owe to the public and to the workers.

Efficient and permanent improvement of industrial conditions can be brought about only by industrial self control, by a co-operation of manufacturers, workers and the consumer.

Humane and decent industrial conditions mean good sanitary conditions of the shops, living wages and hours of labour that do not cause over-fatigue.

No detection of sanitary crimes, but prevention.

No threats, fines or penalties, but friendly counsel, agitation and education. *Bulletin of the Joint Board of Sanitary Control, New York.*

CANCER.*

By PROFESSOR J. M. BEATTIE, M.A., M.D.,
Professor of Bacteriology, Liverpool University, and
City Bacteriologist.

SPEAKING to medical officers of health it may be presumption for me to say that statistical evidence must always be scrutinised with the very greatest care. There is some truth in the assertion that statistics can be made to prove anything, and it certainly is true that many of the published statistics for cancer, based as they often are upon the individual experience, and not checked in any way, are utterly worthless. In going through the literature for the purpose of this paper, the first communication I read states "of more importance is the fact that in women the breast is the second most common site of cancer—the uterus standing first." The second paper, by an equally eminent authority, says that "cancer of the mammary gland is second only to carcinoma of the stomach," which, it is agreed, is the most common form of cancer.

These statistics are often based on the personal experience or even personal impression of one man, and come eventually to be stated as if they were proved facts.

It is, therefore, not surprising that among scientists there is a difference of opinion as to whether or not there has been an actual increase of cancer during the last 10 or more years. Dr. Hingston Fox, writing on the progress of Life Assurance Medicine in 1914, says: "The past 30 years has seen the recorded mortality of this disease in England and Wales to rise in the case of males by 150 per cent., and in that of females by 60 per cent.," and according to the Registrar-General's Report for 1911 cancer accounts for 1 in every 9 deaths among all adults of 25 years and upwards, and in women between the ages of 40 and 60 it accounts for 1 in every 5 deaths. F. L. Hoffmann, in a paper published in the Transactions of the American Gynecology Society, states that "a cancer death-rate of 63 per 100,000 in 1900, and of 74.3 in 1911 for the United States, and, for the large cities, of 37.2 per 100,000 for the five years ending 1876, and of 80.5 for the five years ending with 1911," must represent an actual enormous increase. Sir Thomas Oliver, in a paper in the *Lancet* in April, 1914, gives some quotations from the report to the Scottish Widows' Fund by the late Dr. Claude Muirhead, which seem to show

that the rate is doubled for ages in the period 1881-90 as compared with 1861-70. Other offices, he says, tell similar tales. In one company "the proportion of cancer claims to total which on June 30th, 1901, stood at 8.6 had in June, 1911, risen to 11.14." Further, and probably most important of all, we have the statement of the Registrar-General that the mortality from cancer in 1910 was the highest on record. In 1860 in England the mortality for females from cancer was 500 per million, in 1910 it was 1,070.

In Germany, according to the Imperial German Cancer Commission, during the years 1888 to 1900 the mortality in males rose from 373 to 574 per million living persons. Those who oppose this view claim that the increase is due partly to a greater accuracy in diagnosis and partly to the fact that the requirements and limitations of accurate statistical and pathological inquiry were neglected. In the early reports of the Imperial Cancer Research Fund the fallacies resulting from the unskilled treatment of medical statistics were dealt with, and it was then emphasised that the biological significance of the age incidence of cancer for the separate organs was of great significance, and investigations on these lines have shown that, though it may be quite accurate to say that cancer has increased in females from 500 in 1860 to 1,088 per million in 1911, and in males from 200 in 1860 to 891 in 1911, yet there may be an actual decrease of the mortality from the disease in certain organs—notably in the uterus—and this at once suggests greater accuracy in diagnosis and more successful treatment, for in the uterus diagnosis is relatively easy, and treatment may be quite radical.

In regard to the neglect of pathological inquiry there can be no question that this leads to very inaccurate statistics. Professor Alexis Thomson has shown that a considerable proportion of cases diagnosed even at *post-mortem* as malignant stricture of the pylorus are not malignant at all. Microscopically they are found to be purely fibrous, and every pathologist of experience knows of cases which have been recorded as cancer which on proper investigation have been proved to be non-malignant. Oertel, criticising the American statistics of Hoffmann, points out that in the largest and most important hospital in New York there were in 1912 3,170 deaths, of which 482, or 15.2 per cent., came to the test of *post-mortem* examination. Of these 482, 92 were infants in which clinical observation was very

brief. Of the 390 remaining, in 87 the clinical diagnosis was confirmed; in 116 it was partly correct, *e.g.*, pneumonia diagnosed correctly, but cancer of the uterus not known; in 54, important lesions were undiagnosed (*e.g.*, peritonitis diagnosed, but gastric ulcer undiagnosed), and in 109 the diagnosis was not confirmed, while in 24 there was no diagnosis.

With the increased number of *post-mortem* examinations, though these are still very inadequate, and the increased and more thorough training which British students now get, these diagnostic errors must be reduced, but undoubtedly they still are very high.

Within recent years new diagnostic methods have been employed, especially those of a bio-chemical nature. The only one that needs special mention here is that of Abderhalden, who claims that the serum of cancer patients has the power of breaking down or digesting tumour tissue in a test-tube in a way that normal serum does not, and by a special technique a colour reaction may be obtained which, if present, is claimed to be diagnostic of cancer. Much investigation has been carried out on these lines, and the literature shows that many people are enthusiastic about the results, while others are equally sceptical. The workers of the Imperial Cancer Fund have been working to improve the technique, which they say has "admitted irregularities and imperfections," but even yet they conclude that "too much reliance ought not to be placed on this reaction in the diagnosis of cancer." Now, any chemical method which demands special skill and care if used by inexperienced men, or even these skilled workers who are biassed in its favour, and particularly by that class of workers—and they are not few—who are always wishing to shorten and modify or simplify methods, is bound to lead to erroneous results. We are all familiar with the contradictory observations of two workers on the blood from the same patient in a case of suspected syphilis. The Wassermann reaction is + or — on the same day, and all bacteriological workers recognise that positive Wassermann reactions are being obtained in non-syphilitic cases merely because workers find that too much time is taken up or too much trouble is given in doing the full controls, and they omit certain of these, with often extremely bad results. These special methods undoubtedly lead to error in diagnosis and help to make an apparent increase in the incidence of cancer.

But when due weight is attached to all the fallacies in diagnosis, and the erroneous methods of collecting statistics, there is still, I think, sufficient evidence to justify the view that there is an increase in the number of cases of cancer. Further, we must recognise that a considerable number of lives has been saved by surgical means, and that this saving of life, while not reducing the real incidence of cancer, must certainly tend to reduce the apparent death-rate from this disease and will, to some extent, counterbalance the apparently increased incidence due to improved means of diagnosis.

Heredity.—On this subject there are no reliable data as regards cancer in man, but research has shown very definitely that hereditary predisposition does exist, and that it is sufficient to double the incidence of cancer in female mice, in the ancestry of which cancer had occurred not further back than the grandmother, as compared with animals in which the cancerous ancestry was more remote.

This hereditary disposition may be due to developmental errors, using this in its widest sense, in a special tissue, and may be applicable to that tissue only. Thus, in the experiments in mice it is the mammary gland which is specially affected, and in susceptible animals there is no sufficient evidence that this susceptibility exists in these animals in other organs or tissues than the mamma. We are all familiar with the hereditary transmission of certain peculiarities, extra fingers and toes, naevi, etc., and it seems to me not unreasonable that, in the so-called hereditary cases of cancer, what I have called developmental errors may have been transmitted, and there is abundant evidence that some forms of cancer at any rate arise in places where the tissues are abnormal, *e.g.*, in the scars of burns, in abnormal inclusions in the parotid gland, etc.

Causation of Cancer.—I do not think it would be profitable here to discuss the various theories which have from time to time been promulgated as to the cause of cancer, but will content myself with discussing some data which seem to me to have an important bearing in this aspect of the cancer problem. The question of cancer areas and cancer houses has been very largely discussed and brought forward as definite evidence of a parasitic cause. Naturally experimenters gave considerable attention to this side of the question, and Gaylord in America reported that rats placed in infected cages had become infected, but the whole evidence of both the

Imperial Cancer Research workers and the German Cancer Commission points in the opposite direction, and the amount of work done by these workers is so great that there can be little doubt that contact with animals with natural or inoculated cancer does not increase the liability to the development of the disease. Careful examination has been made of the evidence presented about five of the best known instances of cancer houses by the workers of the Imperial Cancer Research Fund.

Take, for example, two cases given by Dr. Law-Webb. In house A, a domestic servant had suffered from cancer of the breast in 1864, a gentleman who had been an inmate for 30 years died from cancer of the bladder in 1890. A lady who for many years paid an annual visit to this house, staying some weeks on each occasion, says "that her maid who always accompanied her died in 1893 of cancer of the uterus." Thirty years elapsed between the first and the second case, and the third died somewhere else. In his second group the first patient died of cancer of the rectum in 1855, the second (aet 64) in 1889 from cancer of the uterus, the third died in 1890 (aet 57) of malignant disease of the intestine, the fourth (aet 88) in 1899 of cancer of the liver. In his third group in the house next door to the group above No. 1 died in 1870 (aet 60) of cancer of the stomach, No. 2 in 1880 (aet 71) cancer of the rectum, No. 3 in 1881 of cancer of the breast.

On a superficial view these cases may suggest that there is some definite connection between them, but when you examine the returns of the Registrar-General and find that in 1911, out of a total of 145,703 deaths of males above the age of 35, 14,963 died of cancer, and out of a total of 145,270 deaths of females over 35, 19,583 died of cancer—or, in other words, that the chance that a man over 35 will die of cancer is 1 in 9.7 and for a woman above the same age is 1 in 7.4, it is hardly surprising that you should find in any selected area 7 cases of cancer in 44 years as in Groups II. and III. of Dr. Webb, or 3 cases in 44 years as in Group I. Such evidence, when carefully examined, is of so little value that it hardly bears discussion. Other examples with almost as little real evidence have been brought forward to support the contention of Dr. Webb, but to only one of these shall I refer. In the *Lancet* of April 4th, 1914, Sir Thomas Oliver stated that his attention had been drawn to a short street in a small town in which between 1893 and 1908 nineteen

persons and one dog had died of cancer. In some of the houses two or three cases had occurred, and, as in the majority of the cases there was no hereditary tendency, he regarded the matter as more than a coincidence. A very careful investigation has been made on the spot by the workers of the Imperial Cancer Research Fund with the co-operation of the borough medical officer and the medical officer of health for the county, and they found that there were 23 not 19 supposed cases. And in the following table these are recorded.

From the table it will be seen that the diagnosis of cancer was sustained in only 12 cases, though in three others (Nos. 2, 10 and 14) there is ground for regarding cancer as having occurred.

Examining these fifteen cases we find that in only four of the houses was there more than one case, and in these houses the interval between the cases, or, at any rate, between the deaths, were 11, 15, 18, and 19 years, and one case one year. Again, taking the cases as they occurred from year to year we find that from 1892 to 1896 there was one case per year; in 1899, one case; in 1900, two cases; between 1900 and 1906, and again between 1906 and 1910, there were no cases. In 1906 there was one; in 1910, one; in 1911, two; and in 1912, two cases.

The street is of residential detached- and semi-detached villas with gardens. The householders are mostly retired business or professional men, and, naturally, the average age is higher than that of the inhabitants of many other streets in the town. The total number of houses is 41, and in eight of these cancer had occurred over a period of 20 years, there being intervals—as we have seen of 18, 19, 15, and 11 years—between the first and second cases in each of four houses, and in one house a third case occurred one year after the second. The actual estimated crude death-rate from cancer in that street, as stated in the report of the Imperial Cancer Research Fund, is 2.5 per 1,000, and the cancer death-rate for Scotland in 1911 at the age of 45 (not an under-estimate of the age of the population of the street) is 2.04 per 1,000.

There thus seems very little evidence to support the statements made by Sir Thomas Oliver, and it is, to say the least, unfortunate that such statements should be made by men of authority without any apparent investigation as to whether the facts given on hearsay evidence have any basis of truth. The majority of the other alleged "cancer houses" and "cancer areas" have been fully investigated, and the conclusions given in the report of the

Cancer Research Fund are, I think, fully justified. "Cancer houses" are as much a myth as "cancer cages."

The infective theory of the causation of cancer gets little support from these so-called "cancer areas"; and, though the vast bulk of the workers in this country and in Germany have come to the conclusion that cancer is not a parasitic disease, yet strong support is given to the theory by recent research, especially with sarcomata;

recent years leaves no doubt as to the tendency of many workers to view with favour a biochemical or parasitic causation for malignant growths. Versé, in Marchand's Laboratory, reviewing the more recent discoveries of cancer, concludes that the agent which endows a normal cell with malignant characteristics is in many cases a bio-chemical agent acting from without the cells. Other workers talk of activators, ferments, and bio-chemical agents.

TABLE COMPARING THE ALLEGED CAUSES OF DEATH
WITH THE CERTIFIED CAUSES IN "CANCER STREET" IN AYR, TOGETHER WITH
THE OTHER DATA ASCERTAINED

(From Report of Imperial Cancer Research Fund)

House	Case	Age	Occupation	Died	Alleged Site of Cancer	Certified Cause of Death
A	1	64	Clergyman	1894	Bowel	Epithelioma of Rectum
	2	—	Maid. Operation	1912	Stomach	Still living
B	3	65	Wife of Manufacturer	1893	Womb	Cancer of Uterus: 1 year
C	4	86	Widow of Doctor	1897	Stomach	Morbus cordis. Cardiac failure
	5	80	Gent. No relation	1908	Kidneys. Not verified	Renal following upon with Cystitis
D	6	73	Retired	1892	?	Cancer of Stomach, 4 months
	7	78	His Wife	1911	Breast	Cancer of lung
E	8	—	Lady feared to have Cancer	1912	Internal	Still living. Not ascertained
	9	69	Hatter's Wife	1899	Not in list submitted	Cancer of lung
F	10	—	Lady	1900	Breast	Died in Glasgow
G	11	71	Lady	1896	Womb	Cancer of Stomach
	12	80	Brother of above	1898	Bowel	Cerebral Anaemia. Senile decay
	13	—	Sister of above	1908	Bowel	Not found
	14	—	New people bought house	1907	—	—
	15	84	Young lady. Operation	1910	Breast	Still living
H	16	71	Father of above	1911	Stomach	Cancer of Stomach
	17	60	Mother	1912	Stomach	Paralysis Agitans. Carcinoma of left lung
	18	79	Wife of Lawyer	1895	Arm	Scirrhus of mamma, 2 years
I	19	—	Lawyer	1906	Bowel	Malignant tumour of Prostate gland
	20	25	Daughter	1908	Face	Still living.
J	21	72	Lady	1894	Womb	Not found
K	22	49	Wife of Missionary	1899	Breast	Scirrhus of mamma
L	23	—	Lady	1899	—	Not found
	24	55	Dog, aged 4	1909	—	—
			Chemist	1900	Not in list submitted	Malignant disease of tongue (6 months) and sublingual & Pharyngeal glands (2 months).

* The possibility of the suppression of Cancer as a cause of death was specially raised, and it was found that all doubtful or ambiguous returns were inquired into with a view to preventing the suppression of Cancer on Death Certificates.

Arch. Adv. Ltd., Statistical Chart Enginen, Holborn, W.C.

and I shall now briefly deal with this work.

Though I cannot agree with Harvey Gaylord, of Buffalo, when he says that, "When it has been determined that one genuine neoplasm is caused by a viable agent or organism, those who have contended for the parasitic theory as a working hypothesis will feel that the period of controversy on the merits of the hypothesis has passed." Yet when such evidence has been brought forward one cannot dismiss the parasitic theory as unlikely or impossible. A study of the literature within

Recently Rous and others have been able to produce typical sarcomatous growths in chickens by a filterable virus. These experiments show that osteo-chondro sarcomata and also spindle-celled sarcomata can be produced in fowls hitherto normal, by an agent separable from the tumour cells, and capable of passing through a Berkefeld filter, which holds back *B. fluorescens liquefaciens*. The addition to the filtrate of sterile infusorial earth to bring about a reactive tissue inflammation, *i.e.*, to reproduce the irritative phenomena which are

so potent factors in many malignant growths, resulted in a high percentage of successful inoculations, each tumour arising from numerous local points, whereas the filtrate when infected alone caused a tumour much less frequently, and then as a discrete nodule in the tract of injury from the injecting needle.

The significant point in the work is that we already know that these filterable viruses are the cause of infectious diseases, *e.g.*, rabies, pleuro-pneumonia of cattle, infantile paralysis, and possibly measles; and this work of Rous and Murphy makes a distinct advance in the etiology of cancer. It is generally recognised that chronic irritation plays some part in the production of cancer—thus Von Brun in the study for 368 cases of superficial skin cancer was able to establish a predisposing irritant in all but 48. The presence of nematodes, mites, acarines in the cancers of mice and rats is described, and cancers apparently due to Bilharzia are also well known. Now, these parasites, and particularly Bilharzia, in the majority of cases merely cause chronic irritation, which may give rise to considerable overgrowth of tissue. It is only in a few cases that cancer develops. This certainly suggests that they themselves are not efficient causes of the disease, but act because there is some special susceptibility or it may be a special virus (organic or inorganic) present in that particular animal.

When we study the problem of immunity it is proved that there are substances developed in inoculated animals which prevent re-infection. Bashford states in his last report that cancer cells in the mouse injected into the circulation of recovered or resistant animals are robbed of their power of proliferation. It has been shown that this immune mechanism is absent in embryos and also in very young animals, and that cancers implanted in these go on growing indefinitely. Attempts have been made in resistant animals to break down the resistance, and Murphy claims to have done this by injuring the lymphatic apparatus by repeated treatment with Roentgen rays. This is interesting, if merely from the fact that it is by the lymphatic apparatus that many local infections are prevented from becoming general. The lymphatic apparatus is undoubtedly the most fruitful agent in the prevention of general infection of the tissues by bacteria, etc.

Koenigsfeld showed that definite immunity against the growth of mouse cancer could be produced by intraperitoneal injections of small but

increasing doses of dried, powdered mouse cancer, but that a corresponding immunity could not be produced by the use of dried normal cells.

Goldmann, many years ago, in those perfect histological studies of his, showed that individual cancer cells, in the early stages of the disease, penetrated into the blood vessels, and were thus transported, but that in many cases they did not produce metastases. Experimental evidence has confirmed this work, and the only reasonable explanation seems to be that with the growth of cancer, even in man, there is a concomitant resistance produced, and that it is only when this immunity finally fails that metastases develop.

That the blood in cancer cases contains anti-bodies and anti-ferments opposed to the cancer cell is clearly shown by the presence in such cases of special reactions, *e.g.*, the Abderhalden reaction. Now, I bring these facts before you not because I believe that they prove a parasitic origin for cancer, but because I think they give us much hope for the future. We have in many cases been able to stem the flood of infective disease, not because we have erected barriers of treatment but because we have been able to get at the source, to find the cause and to destroy the thing there. With cancer, we are still in the dark as to the cause, but these facts which I have brought before you seem to throw some light on the subject and certainly point the way to the elucidation of the problem—the way of comparative pathology. We are so apt to think of cancer as a purely human disease and to forget that our great field for investigation is among the lower animals, and one would fain hope that the day is not far distant when the veterinary profession in general, or at any rate the Government departments concerned with animals, will become scientists and not mere slaughterers, when faced with disease. In conclusion, I would ask for patience. Ehrlich once said that the cancer problem will never be taken by assault. The patient and extensive work of many investigators is needed; and though it may appear that we are no nearer the solution of the problem than we were 10 or 20 years ago, there is no doubt that, when the problem is eventually solved, it will be evident that the work of the last 10 years has helped enormously in that solution. Workers have given up in despair, donors of money have reluctantly given up their donations because they saw no result, and yet the problem is one of the most important which those who tackle disease have to deal with, and one in which I personally think the outlook is not so dark as it is usually described.

SCHOOL MEDICAL OFFICERS AND DENTAL CONDITIONS AMONG CHILDREN.

By C. EDWARD WALLIS, M.R.C.S., L.R.C.P., L.D.S.,
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PROBABLY few will deny that the amount of dental knowledge possessed by the average school medical officer is very inadequate, and in much need of improvement.

Most medical men now recognise the intimate relations existing between a healthy mouth and a healthy body, to say nothing of the innumerable pathological conditions consequent on, or aggravated by, the serious conditions described under the general term of "oral sepsis."

In addition to this, a large number of the dental deformities of everyday life are entirely preventable, and indeed should be prevented if recognised in their incipient stages by the school medical inspector, who may indeed have the first opportunity of recognizing what is likely to happen to the teeth and jaws as the child approaches its eleventh or twelfth year, when most dental deformities become apparent to the most cursory observer and extremely difficult to treat.

A small amount of judicious extraction at the proper time may entirely prevent the onset of many of the dental irregularities so often seen; in addition, the chronic gingivitis frequently associated with these deformities may be prevented, and the tendency to ultimate pyorrhœa alveolaris arrested at an early age.

It should, moreover, not be forgotten that these irregularities of the teeth and deformities of the jaws are not merely æsthetic deficiencies; if the teeth do not articulate in a normal functional manner the mastication of food cannot be properly performed, and, what is more, the natural tooth-cleansing properties of a healthy dietary cannot take place, with the occurrence of caries as an early consequence.

The expression "oral sepsis" itself appears to be a stumbling block to many, and is often confined to the most exaggerated of cases; it is surely much safer to use this term in a general way, to express the fact that the patient is swallowing pathogenic micro-organisms plus the products of putrefaction.

It is often impossible to specify exactly how much oral sepsis is present without the aid of a skilled dental observer armed with a dental probe and mirror.

In the experience of the writer it is no uncommon thing for one tooth alone, when surrounded by an exudation of pus, to be responsible for most serious ill-health.

It may often be that the pus from one pyorrhœic tooth will contain an almost pure culture of streptococci or pneumococci, though to the cursory observer such a case may not appear to be a bad case of oral sepsis at all.

Another point of considerable interest for the school doctor is the importance of adequately treating the temporary as well as the permanent teeth; the former have large pulp chambers which very readily get infected and lead to chronic or even tuberculous adenitis.

It is just as necessary to stop the teeth of the temporary dentition as those of the second, and the statement that they are only temporary teeth should not be accepted as an excuse for leaving *in situ* septic necrosed roots.

How many, again, mistake the condition known as "arrested caries" for active dental decay, and thereupon condemn the child to unnecessary extraction of a tooth so affected?

A tooth stopped with copper amalgam, which has been discoloured thereby, has been many times sentenced to extraction, whereas, apart from the discolouration due to permeation with copper salts, it may be perfectly healthy and functional.

"Pyorrhœa alveolaris" is frequently of the nature of an obsession to some school doctors, who fail to realize that it is a condition characterized by certain definite clinical signs just as evident as are those of measles or scarlet fever and not a mere vague condition of oral sepsis.

The functions of a school medical inspector in regard to teeth may perhaps be summarized shortly thus:—

1. He should be able to recognize and differentiate with facility teeth of the first and second dentitions.
2. He should be aware of the normal dates of their eruption and the deformities that may result from premature or delayed extraction.
3. He should recognize at an early stage such deformities as superior or inferior protrusion, with a view to their prevention when possible and their treatment when necessary.
4. He should be able to recognize common dental maladies such as early alveolar abscess, dental fistulæ, pyorrhœa alveolaris, and the phenomenon referred to above, namely "arrested caries."

5. He should have a full realization of the seriousness of oral sepsis in its relation to the health and development of children.

As already stated, one tooth alone, from around which pus is exuding, may contain virulent bacteria and lead to constant ailing, and consequent backwardness at school.

The writer some years ago, at the L.C.C. Michael Faraday School, in Walworth, collected together a number of special dental charts, which indicated in detail the worst cases of oral sepsis in the school, and asked the headmaster to let him know how these children stood in regard to their general application and school work.

All of these children, without exception, were much below the average of their age, and it is not unreasonable to suggest that their wretched condition of health and low position in the school were largely dependent upon the filthy condition of their mouths.

Every dentist familiar with children knows well the miracles that are frequently wrought by the rendering of a septic mouth free from dental sepsis.

When advising parents as to how much dental treatment may be necessary, the school doctor should be very guarded in his language, as it may be that the dentist, after careful inspection with a dental probe and mirror, will find several more extractions necessary. A disagreement between the advice given by the school doctor of the treatment found necessary by the school dentist often leads to unpleasant disputes between the parent and the dentist which need never have occurred.

Unfortunately no adequate provision for the dental instruction of school medical inspectors exists at the present time, though it would be quite easy for such to be arranged.

MOUTH INFECTIONS AND THEIR RELATION TO PYORRHOEA.—An interesting study concerning the relation of certain micro-organisms to pyorrhoea, and designed to devise, if possible, preventive measures against this condition, is now being carried on at P.S. 21 by bacteriologists of the Bureau of Laboratories of the Department of Health of the City of New York. A special class has been organised, consisting of children whose gums show evidences of the possible beginning of pyorrhoea. This will be sub-divided into several groups, one of which will serve as the control, and the others to be submitted to a definite course of treatment. The course of the condition will be followed both clinically and microbiologically, and the investigation promises to yield valuable information.

REMARKS UPON SOME PROBABLE DEVELOPMENTS OF THE WORK OF STATE VETERINARY OFFICERS.

By PROFESSOR S. DELÉPINE, M.B., C.M., M.Sc.,
Director of the Public Health Laboratory, University
of Manchester.

IN a previous article on the training of veterinary surgeons for public duties (PUBLIC HEALTH, September, 1914), an attempt was made to indicate the nature of the special training needed by veterinary surgeons who wished to devote themselves to administrative and other work bearing upon the prevention of human and animal diseases.

It was shown that a fairly heavy and lengthy course of post-graduate studies was needed by candidates for the Diploma in Veterinary State Medicine, in order that the diploma should be a guarantee of the fitness of its holders for the discharge of public duties in relation to public health, veterinary preventive medicine and hygiene generally.

The number of responsible and well-remunerated full-time public posts open in this country to men who have devoted some time to post-graduate studies bearing upon the prevention of animal diseases is comparatively restricted at present, and, consequently, the number of men undergoing special training in preparation for these posts is small.

The time must, however, come sooner or later when it will be recognised that further progress in the control of animal diseases for agricultural and public health purposes can only be realised by the creation of a well-organised and competent State Veterinary Service.

The very important work which has been done by the Board of Agriculture and the veterinary colleges with regard to several epizootic diseases, of which I need only mention a few, such as contagious pleuro-pneumonia, rabies, swine fever, foot and mouth disease (outbreaks of which are liable to occur with dramatic suddenness), must not blind us to the fact that there are other diseases which are always with us, constantly spreading and claiming a vast number of victims but attracting less attention because they are more insidious, more slowly progressive and possibly more troublesome to deal with.

It would be difficult at the present time, except with regard to some of the acute epizootic diseases to which the Board of Agriculture devotes special attention, to obtain

accurate data as to the prevalence and distribution of animal diseases; yet without this knowledge the devising of proper measures for the control and prevention of these diseases is difficult, if not impossible.

In connection with tuberculosis, some sanitary authorities have appointed veterinary surgeons to co-operate with the medical officer of health, more especially with the view of preventing infection of human beings. The amount and responsibility of the work thrown upon some of these officers may be indicated by one example.

The veterinary officer appointed by the Manchester Sanitary Committee to inspect cows and farms in connection with the milk supply, has had under his supervision more than 35,000 cows housed in nearly 2,000 farms situated chiefly in six counties.

In several important cities the inspection of meat is entrusted to competent veterinary inspectors, but this system is not yet general, and where it is in force the amount of work thrown upon the veterinary staff is so great that only part of the good that might be expected is realised.

In the year 1904, in Manchester, the number of carcasses that had to be inspected amounted to more than one per minute, day and night.

Were the present state of things to continue indefinitely, our knowledge of the causes, prevalence, distribution and prevention of the diseases to which animals are liable in this country, could not be expected to grow very rapidly. It is, however, to be hoped that in the near future there will be in each county a sufficient number of competent State veterinary officers devoting the whole of their energies to the study of the causes, the occurrence, the conditions influencing the prevalence, the administrative control and the prevention of the animal diseases occurring in the districts in their charge.

From these officers and, if necessary, from officers connected with county boroughs, the agricultural and the public health authorities should be able and entitled to obtain all the information they require. In each administrative area the veterinary staff should have at their disposal isolation sheds suitable for the study of living animals affected with diseases requiring investigation.

The opportunities offered by the abattoirs should also be utilised for the purpose of controlling accurately the effects of preventive measures carried out in country districts. At

each important public abattoir (all abattoirs should be public) there should be one or more competent officer, whose duty it would be to determine the exact nature of the diseases causing the lesions observed in slaughtered animals. By a well-organised system of registration it would be possible after a comparatively short time to obtain more accurate ideas than we have at present of the prevalence and distribution of animal diseases. The central authority, by which the work of all these local officers would be co-ordinated and to which all their reports would gravitate, would be in a better position than it is at present to legislate and govern efficiently.

The previous remarks relate only to some of the branches of a Home Veterinary Service, the creation of which cannot be indefinitely postponed.

It must, however, be remembered that there are other departments opened to well-trained veterinary officers. Among these may be mentioned the Army Veterinary Service, the Indian Civic Veterinary Department, the Colonial Veterinary Services, the Veterinary Department of the Board of Agriculture and Fisheries.

These few remarks are intended to show that, although present conditions are not such as to stimulate keen competition for public posts open to veterinary health officers, the future may have in store greater inducements to specialised studies.

THE CAMPAIGN AGAINST CANCER IN NEW ENGLAND.

ACCORDING to the report of the Census Bureau (U.S.A.), in 1913 there were 49,928 deaths from cancer in the registration area of the United States, corresponding to a death-rate of 78.9 per 100,000 of the population. All the New England States have individual cancer death-rates much higher than this. Connecticut's rate, which was the lowest of any of the New England States, was 85.1. Vermont's rate was the highest, with 111.7, while the rates of the other States were correspondingly high, Maine having a rate of 107.5, New Hampshire, 104.4, Massachusetts, 101.4, and Rhode Island, 93.3. When these figures are compared with those of Kentucky, with a rate of 48, they seem indeed very high. They mean that 6,817 people died in 1913 in New England from cancer. But it does not necessarily follow that cancer is more common in New England than elsewhere. The Census Bureau attributes the high cancer death-rates in certain districts to the relatively high age distribution of the population and the negligible amount of immigration. Translated into every-day terms this means that in New England the proportion of people over forty years of age, or at the cancer age, to those under forty, and so less liable to cancer, is greater than in other places. Yet there is no doubt that the cancer death-rate in New England, as well as in other parts of the country, is much higher than it ought to be. Those who know the facts believe that if the public can be properly educated in regard to the early signs of the disease, and will act on this knowledge, the present mortality should be reduced at least half and perhaps two-thirds.

MILROY LECTURES (1915).

INDUSTRIAL PNEUMONOCOPIOSIS,
WITH SPECIAL REFERENCE TO
DUST-PHTHISIS,BY
EDGAR L. COLLIS M.B. (Oxon.),
H.M. Medical Inspector of Factories.*Continued from page 263, August "Public Health."*
BRONCHITIS.

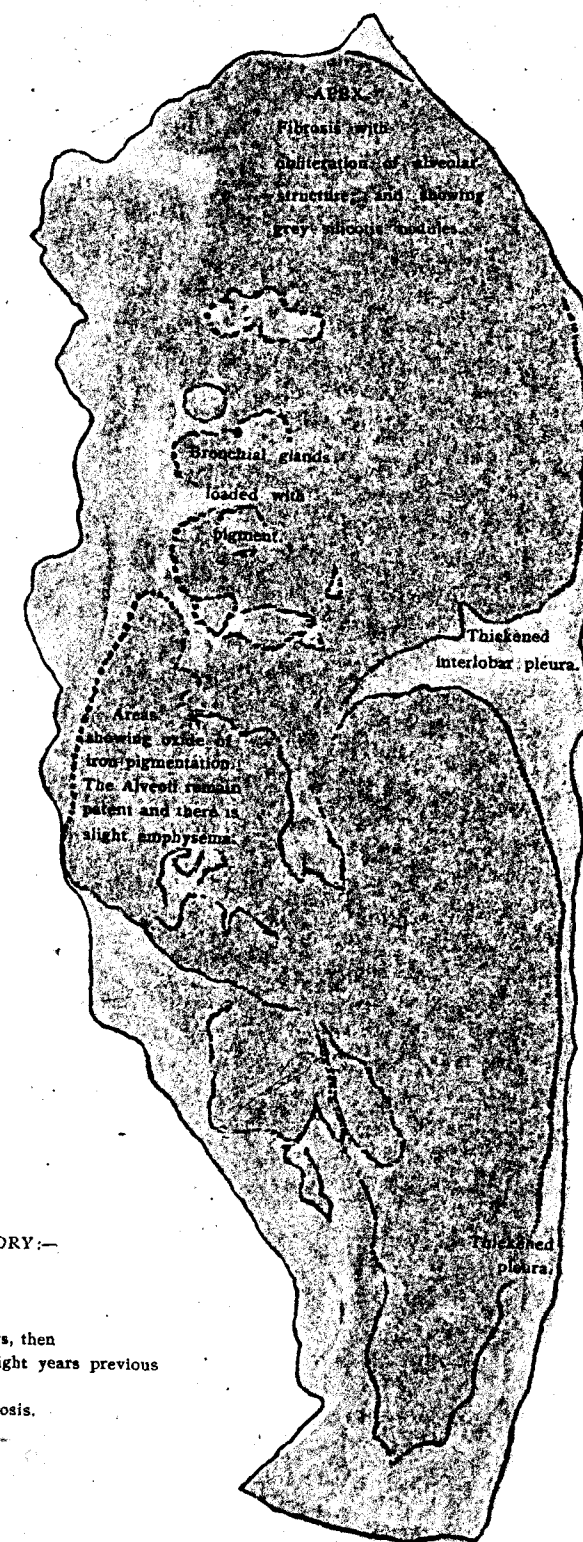
Prevalence.—The study of the prevalence of this disease in occupations, as indicated by mortality statistics, presents certain difficulties, because the disease is most prevalent in the general population at the later age-periods of life, from 55 years of age and onwards. At these ages, when the days of strenuous physical exertion are past, the occupation followed during the working period of life is less accurately filled in on certificates of death and on census returns, which are the basis of the Registrar-General's figures; while, when the records of Friendly Societies are under consideration, the tendency, owing to bad trade or other reasons, for members, as they advance in years, and can no longer be readmitted, to surrender their membership, causes many deaths from this disease occurring late in life to escape the records.

The prevalence of a disease in any given group of mortality statistics is best indicated by the annual death-rate at various age-periods per 1,000 living; but, unfortunately, such figures are not always available, and even after great trouble the authorities at Somerset House are unable to deal in this way with some of the most interesting occupational groups. Valuable information, though confessedly incomplete, can, however, be obtained by examining the causes of death of a sufficient number of persons whose exact occupation is known, without considering the number among whom these deaths occurred. If such deaths be classified according to age-period, the percentage of all deaths due to any special disease at each age-period can be stated. Table 3 contains death-rates from bronchitis at certain age-periods for certain groups for which both the mortality per 1,000 living, and the percentage of all deaths are known; and it shows that when the death-rate per 1,000 living exceeds the standard, the percentage of all deaths as a rule also exceeds the standard. Reversing the process, I think the deduction fair that when the percentage mortality is, at any rate markedly, say 20 per

cent., in excess of the standard, the mortality per 1,000 living, could it be obtained, would also be found to be in excess. If, for example, the percentage of deaths at various age-periods due to bronchitis among masons who worked on sandstone is taken and compared with that for Lancashire coal-miners, a similarity is present which suggests that the mortality per 1,000 living, could it be obtained for sandstone masons, would, like the mortality per 1,000 for Lancashire coal-miners, be found to be in excess (see fig. 2).

Should for any reason the mortality from all causes, except the one under consideration, be abnormally low, this method gives an exaggerated idea of the probable mortality-rate per 1,000 living, but it still indicates the relative prevalence of any one cause of death. This method is thus far defective, but I desire to dwell on its value, because, from the records of trade societies, and from searches through local registers carried out over a series of years to obtain a reasonable number of deaths, information as to causes of death among individuals whose exact occupation is known, can frequently be obtained, and can be examined by this method, even when no estimate of any value can be made of the size of the population among whom these deaths occurred. The investigation I made (77*d*) into the mortality of members of the Operative Stonemasons' Society of England and Wales, and of the United Operative Masons' Association of Scotland, is an instance of the value of this method. Hoffman has called (54) this statistical method "the proportionate mortality," and he has laid stress upon its value "particularly in relation to the broad questions involved in the modern problems of industrial hygiene," because "it emphasises the true incidence of preventable causes of death by divisional periods of life. . . . Granting the limitations of this method, it remains for practical purposes, and particularly with regard to the needs of industrial hygiene, the most useful one available."

The figures of Table 3 indicate that while workers in the open air do not suffer in excess from bronchitis, operatives in certain dusty industries do so suffer, and that this excess occurs sometimes in association with excessive mortality from phthisis, *e.g.*, tin-miners and grinders of metals, and sometimes in association with excessive mortality from pneumonia, *e.g.*, Lancashire coal-miners and dressers of iron castings, but that it is seldom



OCCUPATIONAL HISTORY:—

- (I) Ironstone Miner (England), then
- (II) Goldminer (Transvaal), then
- (III) Ironstone Miner (England), then
- (IV) Goldminer (Transvaal) for 5 years, then
- (V) Insurance Agent (England) for eight years previous to death.

Cause of Death:—Pulmonary Tuberculosis.

VERTICAL SECTION from Lung of Man who worked at IRONSTONE-MINING in England and GOLD-MINING in the Transvaal. Natural Size and Natural Colour.

NOTE.—The Frontispiece referred to on p. 258 faces this instalment.



VERTICAL SECTION from Lung of Man who worked at IRONSTONE-MINING in England and GOLD-MINING in the Transvaal. *Natural Size and Natural Colour.*

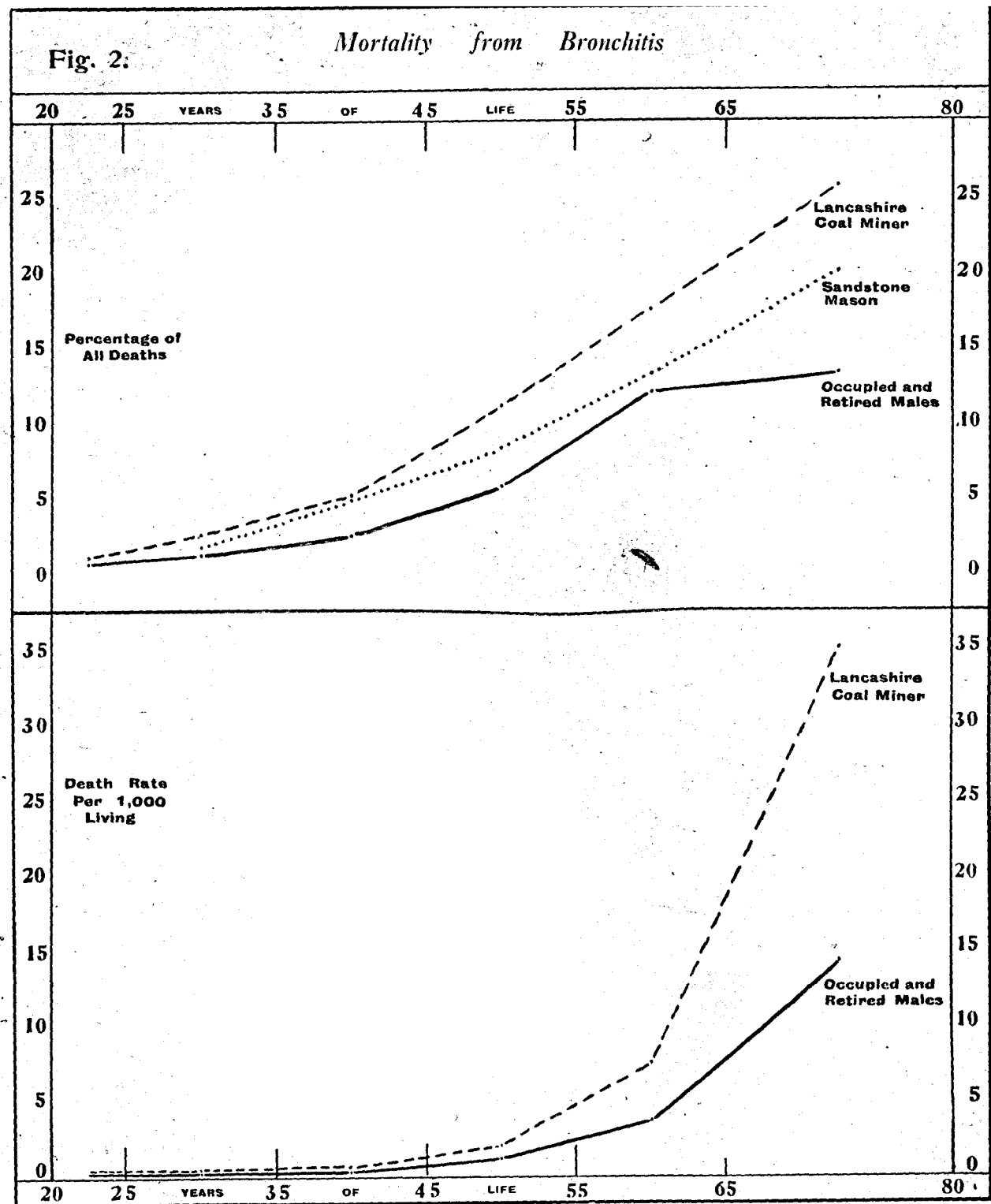


Table 3. *Death-Rates from Bronchitis for Certain Classes of Males distributed in Age-Periods.*

CLASS	EXPOSURE TO DUST	PERIOD UNDER REVIEW	TOTAL NUMBER OF DEATHS FROM BRONCHITIS	PER 1,000 LIVING AT AGE PERIOD						PERCENTAGE OF ALL DEATHS AT AGE PERIOD						PREVALENCE OF PHTHISIS	PREVALENCE OF PNEUMONIA	MEDIAN AGE AT DEATH FROM ALL CAUSES
				20-	25-	35-	45-	55-	65 AND OVER	20-	25-	35-	45-	55-	65 AND OVER			
Occupied and Retired Males Agricultural Districts Fisherman Shipbuilding Tailor Shoemaker Durham & Northumberland Coal Miners Nottingham & Derbyshire Monmouth & South Wales Lancashire Blick Plain Tile Terra Cotta Maker Wool Worsted Manufacture Cotton Manufacture Sawyer & Wood Turner Cooper etc. Cutler Scales Maker Potter Earthenware etc. Manufacture Tin Miner Dressers of Iron Castings Sheffield Cutlery Stone Gutter Dresser Mason Grinder of Metals Slate Quarrier Worker	Country Air	1900-1902	40,223	0.03	0.08	0.22	1.06	3.62	14.07	0.6	1.2	2.5	5.7	10.2	13.2	Standard	Standard	57 to 58 over 67
	Seaside Air	do.	1,509	0.00	0.03	0.07	0.22	0.95	8.43	0.0	0.7	1.3	2.4	5.3	10.7	Low	Low	59
	Outdoor Industrial	do.	71	0.00	0.06	0.20	0.36	1.64	9.17	0.0	0.7	1.6	2.4	6.0	9.1	Low	Low	58 to 59
	Indoor Industrial	do.	292	0.00	0.03	0.23	0.75	3.04	11.57	0.0	0.7	2.6	5.2	9.8	13.0	Low	Normal	61 to 62
	do.	do.	697	0.02	0.06	0.21	1.18	3.88	15.22	1.6	1.0	3.9	5.9	10.4	13.6	In Excess	Low	62 to 63
	do.	do.	1,182	0.05	0.11	0.32	0.99	3.65	15.12	1.0	1.6	3.1	5.3	10.7	14.1	In Excess	Low	54
	Coal only	do.	255	0.05	0.05	0.14	0.47	3.06	18.82	1.0	1.1	2.2	3.4	9.7	12.1	Low	Low	54 to 55
	Mainly Coal	do.	170	0.00	0.06	0.17	0.42	3.94	24.62	0.0	1.7	2.8	3.8	12.6	23.2	Low	Low	47 to 48
	Coal, Shale etc.	do.	435	0.01	0.07	0.20	1.32	8.15	24.06	0.3	1.2	2.3	8.3	20.5	22.8	Low	In Excess	47 to 48
	Coal, Shale etc.	do.	296	0.05	0.16	0.46	1.94	7.44	34.96	1.0	2.6	5.1	11.1	17.5	25.6	Low	In Excess	47 to 48
England and Wales Wool Worsted Manufacture Cotton Manufacture Sawyer & Wood Turner Cooper etc. Cutler Scales Maker Potter Earthenware etc. Manufacture Tin Miner Dressers of Iron Castings Sheffield Cutlery Stone Gutter Dresser Mason Grinder of Metals Slate Quarrier Worker	Clay	do.	172	0.00	0.05	0.30	1.08	2.52	14.98	0.0	1.2	4.4	8.4	10.9	15.4	Normal	Normal	58 to 59
	Wool debris	do.	385	0.03	0.18	0.16	0.95	3.59	19.33	0.6	3.4	1.7	5.3	8.8	13.1	slight excess	Low	61 to 62
	Cotton debris	do.	704	0.05	0.07	0.29	1.68	6.16	23.29	1.1	1.2	2.9	8.0	13.1	15.7	Normal	In Excess	55 to 56
	Sawdust	do.	377	0.07	0.09	0.46	1.52	4.22	17.97	1.8	1.7	4.8	7.2	11.7	15.0	In Excess	Some excess	60 to 61
	Metal, Quartz, Bone, Emery etc.	do.	126	0.00	0.00	1.00	2.87	7.21	23.07	0.0	0.0	5.7	8.9	13.0	17.1	In Excess	Some excess	56 to 57
	Clay and Flint	do.	278	0.00	0.10	1.29	5.58	14.84	27.62	0.0	1.9	8.6	17.2	25.2	20.5	In Excess	slight excess	52
	Quartz	do.	66	0.00	0.44	0.86	3.57	13.00	32.45	0.0	3.3	3.2	9.3	18.9	20.6	In Excess	Low	54 to 55
	Sand, Clay, Emery, Metal, Charcoal	1893-1912	52	—	—	—	—	—	—	0.0	0.0	4.0	10.3	23.5	23.6	Low	In Excess	49
	Metal & Quartz	1908-1912	56	—	—	—	—	—	—	7	1.6	2.2	8.1	15.4	26.0	In Excess	Low	49
	Metal, Bone, Emery Linen, etc.	do.	63	—	—	—	—	—	—	7	2.9	3.8	5.3	12.9	16.6	In Excess	Normal	59 to 60
England and Wales	Quartz	1910-1912	291	—	—	—	—	—	—	0.0	1.7	4.9	7.3	13.1	20.0	Excess	Low	56 to 57
	Calcium Carbonate	do.	75	—	—	—	—	—	—	0.0	0.0	2.1	3.5	9.0	11.2	not excessive	not excessive	61 to 62
	Metal & Quartz	do.	54	—	—	—	—	—	—	0.0	1.7	1.8	10.5	12.6	23.5	In Excess	Low	48 to 49
		do.	35	—	—	—	—	—	—	0.0	0.0	1.5	7.2	5.9	5.5	In Excess	No Excess	60 to 61

* Calculated from Supplement to Sixty-Fifth Annual Report of Registrar-General for Births, Deaths and Marriages in England and Wales, Part II., 1908. Wyman & Sons. (Cd. 2619.)

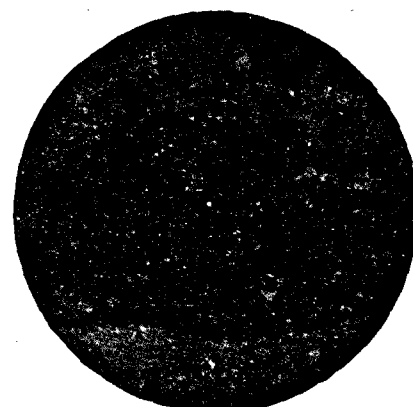
† Calculated from data given in Annual Report on the Health of Sheffield for 1913, pp. xiii-xiv

‡ Calculated from data courteously supplied by General Register Office.

NOTE.—All figures in excess of the standard for Occupied and Retired Males are underlined.



Pigmented Nodule.

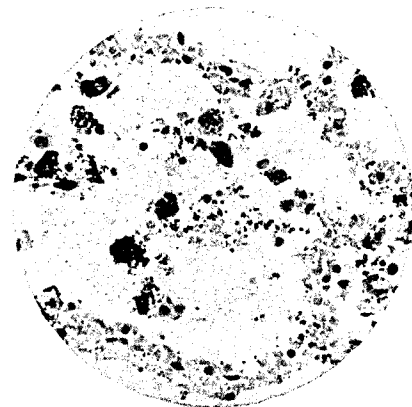


Same Field seen by polarised light.

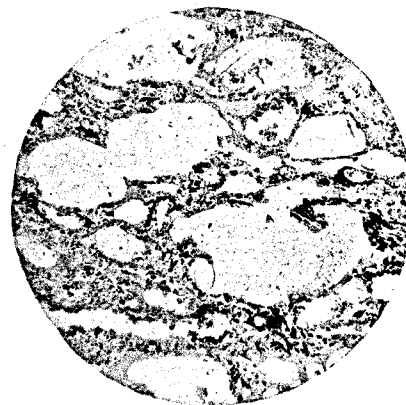
FIG. 3.—COAL MINER'S LUNG.

(North Staffordshire).

The presence of dust other than coal is indicated by the polarisation of light.



(a) Free Carbon particles in air vesicles with several phagocytic cells taking up the particles into their cytoplasm.



(b) Carbon particles in the lymphatic spaces of air cells and perivascular channels

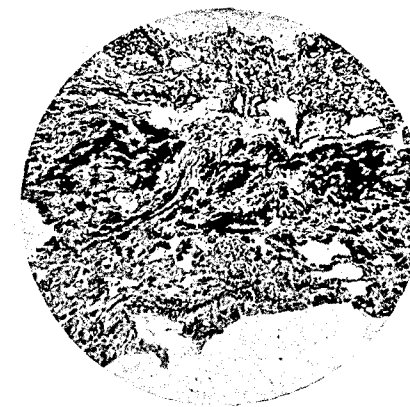


(c) Fibrous and pigmented nodule.

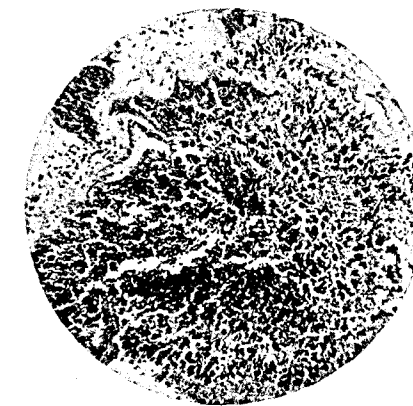


(d) Pigment associated with general fibrous change.

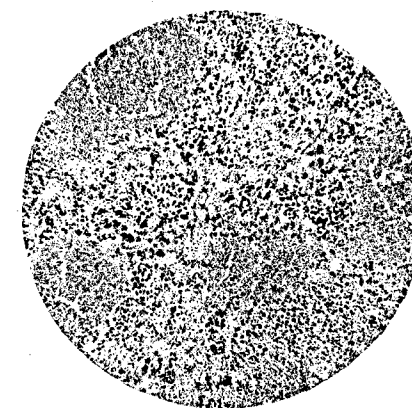
FIG. 3.—PLATE I.



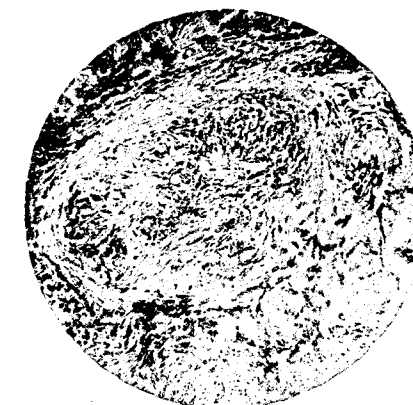
(e) Pigment in the lymphatics of the deeper layer of the pleura.



(f) Small lymph gland containing pigment.



(g) General deposition of pigment in a bronchial gland.



(h) Pigmented and fibrous hyperplasia of bronchial gland.



(i) Mesenteric gland with comparatively little pigment.

FIG 3.—PLATE II.

(For this Series (a) to (i) I am indebted to Dr. F. Shufflebotham

found associated, at the same age-period, with excessive mortality from both phthisis and pneumonia. To establish a relation between dust inhalation and the prevalence of respiratory diseases among coal-miners, some reference to the nature of the dust to which these men are exposed is necessary. My predecessor in this lectureship, Dr. Shufflebotham, remarked (55) that "fibroid lung is rare amongst coal-miners, and anthracosis does not seem to entail disablement," but he pointed out, just as Dr. Trotter had previously done (87), that coal-miners are exposed not merely to coal dust, but also to dust of the strata in which the coal is found; and Oliver has suggested (94a) that "when a coal-miner's lung shows pronounced fibrosis, it is generally an indication that the individual has worked in a coal seam which contained a quantity of stone; it is the stone dust in the coal, not the coal itself, which . . . is the cause of the fibrosis" (see fig. 3). Probably the prevalence of respiratory diseases among miners depends on the amount and the character of the stone dust present. The influence of coal-dust itself which has been carefully investigated (88) in America by Dr. Wainwright and Dr. Nichols is remarkable. These workers, having first ascertained that statistical data from every available source agreed in establishing that coal-miners are singularly free from phthisis, exposed guinea-pigs for about two months to the inhalation of coal-dust, and then injected a culture of tubercle bacilli into them. Such anthracosed animals developed "extensive tuberculosis of the abdominal viscera and of the glands round the tracheal injection, but the lungs were free," while control animals developed "extensive tuberculosis of the lungs and abdominal viscera." Such facts are evidence that coal-dust in some way protects against phthisis. Coal dust then is not injurious, but, because it can be easily distinguished, it is useful to demonstrate the path by which dust enters and travels through the lungs. First it reaches the alveoli, where it is taken up by phagocytes (see fig. 3a); these carbon pigmented phagocytes pass through the walls of the air vesicles into the lymph channels and deposit their pigment in the perivascular spaces (see fig. 3b). Should the lymph channels in any place be blocked by fibrous tissue, the pigment collects there, whether the blocking be localised (see fig. 3c), or diffuse (see fig. 3d). It is found particularly beneath the pleura (see fig. 3e); and also

in the pulmonary glands (see fig. 3f), and in the bronchial glands (see fig. 3g), where also it accumulates where there is fibrous tissue (see fig. 3h). In other lymphoid tissue, however, for example, the mesenteric glands (see fig. 3i), comparatively small deposits are to be found. Broadly speaking, in Durham and Northumberland coal lies in nearly horizontal seams, and is got with a minimum disturbance of other rock; while in Lancashire the coal seams, though resembling those of Durham and Northumberland in thickness, lie at a steep inclination and much intervening rock has to be "ripped." The Nottingham and Derbyshire coalfield in this respect resembles the Durham and Northumberland field, and the mortality from respiratory diseases, bronchitis and pneumonia, among the miners on the two fields is low. Exposure to dust arising from intervening rock in the Monmouth and South Wales coalfield resembles that of the Lancashire field, and the mortality from bronchitis and pneumonia among the miners on these two fields is high.

At the outset then the form of respiratory disease which follows upon dust inhalation is found to vary with the kind of dust inhaled; and bronchitis, which occurs in excess when ever there is exposure to injurious dust, appears to be *par excellence* the chief of the pneumoconioses. The importance of bronchitis as an indication of the injurious properties of a given dust has been somewhat overlooked for two reasons (i) the excessive mortality from phthisis experienced in some dusty industries has overshadowed it, and (ii) bronchitis is a complaint which advances slowly, and, though causing incapacity, does not cause much mortality during the working period of life. Probably when invalidity statistics of occupation become available, this disease will stand out clearly as the chief cause of invalidity in dusty occupations.

Causation.—The curves, shown in fig. 2, which represent the mortality from bronchitis at various age-periods among those exposed to dust inhalation, are similar (only at a higher level) to that for the general population, suggesting that the disease in the dust groups is due to the same influences, only in intensified form, as produce the disease in the general population. This method of obtaining a clue to the causation, in any given group, of a disease which also occurs in the general community appears to have been first used by Givre (27b), though the abscissæ of

his curves were calendar years and not age-periods. The value of this method will be more apparent when dust-phthisis is under consideration.

The causation of bronchitis in general, leaving on one side the influence of microbic invasion, may be summed up as any stimulation of the bronchial mucosa which determines such an inflammatory hyperæmia of the walls of the air passages that an excessive exudation of mucus results. Dust suspended in inspired air falls on the walls of the bronchi and bronchioles; and, to be removed, must be entangled in mucus and swept back by ciliary action until it can be expelled by coughing. To effect this purpose the secretion of mucus and the ciliary action increase with the amount of dust inhaled. Increase this process beyond physiological elasticity and there occur degeneration and destruction of the ciliated mucosa, and, synchronously, a mechanical ballooning of the alveoli, emphysema, which is produced by frequent coughing to remove the unusual amount of mucus secreted. Other influences besides dust may over-stimulate the bronchial mucosa, but the important part dust plays is shown by comparing the incidence of the disease among fishermen and agriculturists with that among classes who live in atmospheres more laden with dust.

While the influence of dust in general in the causation of bronchitis may be accepted, certain dusts do not appear to exert such an influence. Thus coal-dust, unmixed with other material, *e.g.*, Durham and Northumberland miners, is not associated with bronchitis. And, although mortality statistics are not available, careful investigations made in France (56) into the manufacture of plaster-of-Paris, and by Arlidge (40c), whose observations among alabaster workers I can personally confirm, suggest that calcium sulphate belongs to this class. Investigations as to the effect of limestone on masons made by Barwise (57) in Derbyshire, by Howard in the Isle of Portland, and myself (58) among masons in many districts, indicate that limestone dust has no marked effect in causing bronchitis, and recent mortality figures stated in Table 3 justify this conclusion. Pure clay, as contrasted with highly siliceous fireclays, seems also to have no effect. Inquiry into the manufacture of cement (59), and mortality figures for cement workers, which only show 23 deaths from bronchitis out of a total of 293

—*i.e.*, 7.8 per cent. as compared with 8.4 per cent. for Occupied and Retired Males—necessitates the addition of cement to the list, notwithstanding the amount of dust generated (60) in its manufacture and its hygroscopic nature. Nor is there any evidence that dusts of animal origin, such as bone, leather and horn, when unmixed with other things, conduce to bronchitis.

On the other hand, the data of Table 3 show that exposure to the inhalation of certain dusts is associated with a high mortality from bronchitis; the mortality among masons who dress sandstone places sandstone dust in this list; the mortality of Lancashire coal-miners condemns dust of the strata between the coal seams; the mortality among potters must be ascribed to flint dust; that of tin-miners to quartz dust; and that of cotton operatives and wood workers to dust arising from the materials they manipulate. To this list may be added from clinical evidence dusts of flax (38d), jute (62), hemp (14), slag-wool (59a), glass and emery (53). These dusts differ widely in origin and in chemical composition, but possess the following common properties: (i) such brittleness as leads them to break into fine dust; (ii) insolubility in the normal secretions of the air passages; and (iii) non-plastic (*i.e.*, probably non-colloidal) structure.

Clinical Symptoms.—Bronchitis induced by dust is essentially a chronic disease. Cough, and free expectoration of sputum coloured with the dust inhaled, are the primary symptoms which are directly referred by the worker to his occupation. If the period of exposure has not been unduly prolonged, absence from occupation is followed by cessation of the symptoms which, however, return when work is resumed. Dr. E. S. Reynolds, with his knowledge of the industrial conditions of Manchester, has described (93) at this stage the existence of a fine tube bronchitis especially prevalent among those exposed to emery dust; a condition which he considers is, in adults, seldom seen apart from exposure to dust.

After more prolonged exposure the bronchitic condition becomes so established that only slight improvement follows upon rest; and, sooner or later, the symptoms usually associated with chronic bronchitis appear, shortness of breath and other signs of cardiac distress. These are, however, well-known, and need not be restated here.

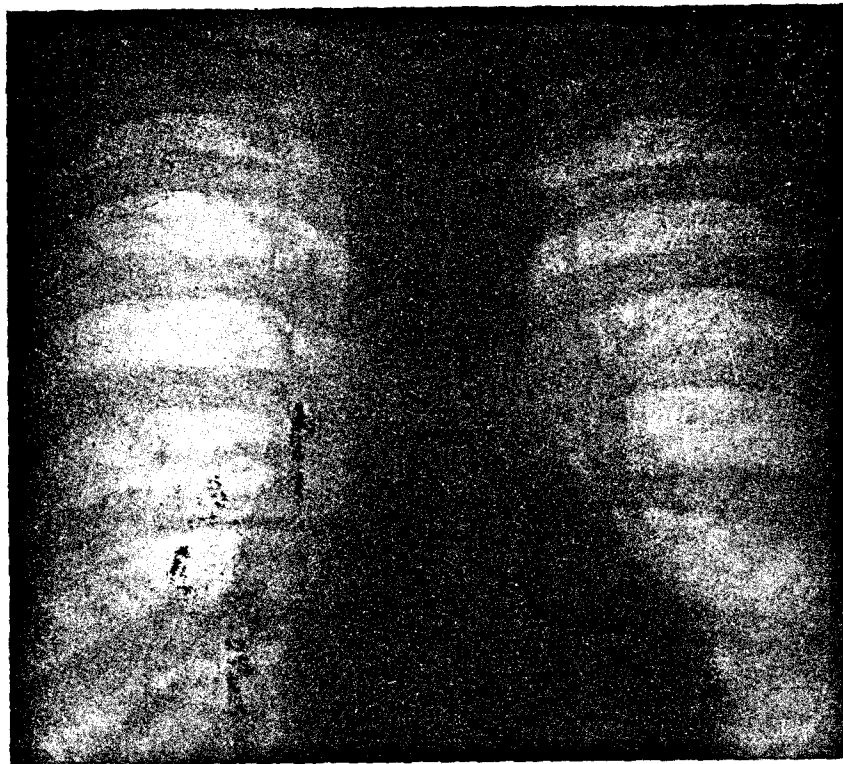


FIG. 4.
SKIAGRAM (taken by Dr. Goulesbrough) of an apparently healthy man after 14 years' exposure to fine emery dust in the manufacture of emery paper.

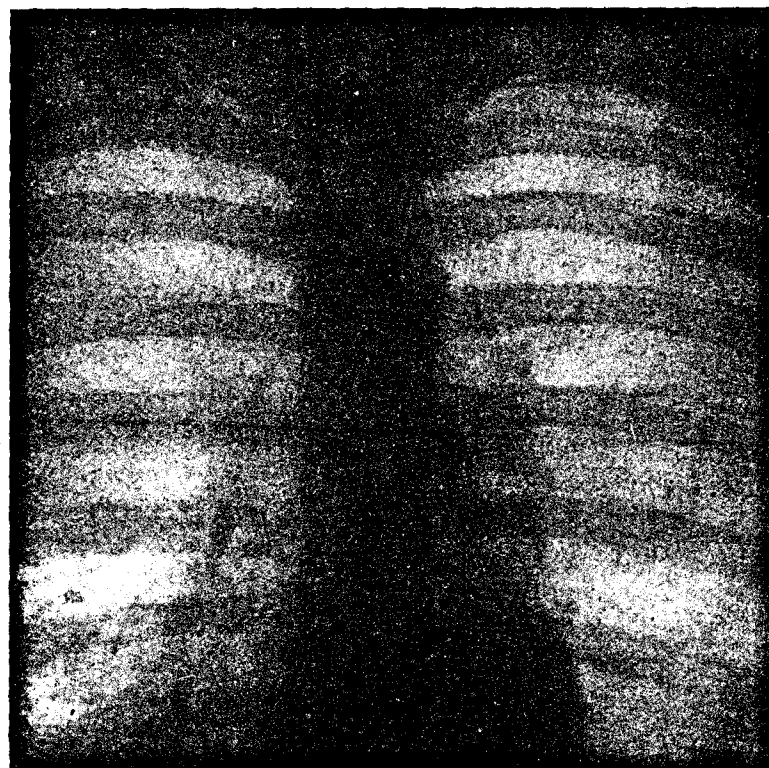


FIG. 5.
SKIAGRAM (taken by Dr. Goulesbrough) of an apparently healthy man after 27 years' exposure to fine glass dust in the manufacture of glass paper.
NOTE.—Skiagrams of workers exposed for shorter periods to these dusts showed similar but less marked shadows.

Differential Diagnosis.—What has been said of clinical symptoms shows that the diagnosis of pure dust-bronchitis cannot be safely made from the study of an individual case, but only from previous knowledge of the exposure of the individual to dust, and of the known effect this dust has in causing bronchitis. Even then, since bronchitis occurs in the general population, the influence of dust inhalation only raises a question of probability in the causation of each case, a probability which the presence in the sputum of dust known to be associated with excessive bronchitis supports. When present in an individual in whom dust inhalation has caused pulmonary fibrosis, or the barrel-shaped chest typical of asthma, the physical signs of these conditions may indicate the connection between dust inhalation and the disease; but when it is present in individuals exposed to such dusts as emery, glass and slag-wool, unless the fine tube bronchitis described by Reynolds is present, there may be nothing to distinguish the case from any ordinary case of bronchitis. If a group of individuals is under examination, the unusual number and the early age of those affected may suggest the origin of the trouble; and at one factory where exposure to dust of emery and powdered glass was in excess, although no history of any prevalence of phthisis among the workers could be obtained, and although no definite signs of fibrosis could be detected, I found an unusual number of men, as may be seen by referring to Table 4, in the prime of life suffering from bronchitis, emphysema, and having an average chest expansion below normal.

Table 4 EXPOSURE TO EMERY AND GLASS DUST			
Nature of Work	Number Examined	Number with Chests Showing Signs of Disease	
Engaged in dusty Processes	50	13	26 Per Cent.
Yard Labour, Engine-men, &c. Exposed to General Dust of the Factory.	25	2	8 Per Cent.

This diminution in chest expansion which is characteristic of dust inhalation is also a characteristic of chronic bronchitis, as also is the presence of emphysema, although this condition is less marked when pulmonary fibrosis is present.

A correct diagnosis, though often difficult to arrive at, is of importance in advising the patient as to the future; and some help may be obtained from radiography, for evidence does show that the changes induced in the bronchial mucosa may be detected as shadows which in size and distribution coincide with

the ramifications of the air passages, and differ markedly from the shadows thrown in cases of dust-phthisis. These shadows resemble those seen in cases of marked bronchitis of other causation; and they are more marked as the exposure to dust has been more prolonged (see figs. 4 and 5).

Pathology.—The degeneration of the bronchial mucous membrane, and the condition of emphysema coincide with those described for ordinary bronchitis in every text book, and require no repetition here. After death dust particles will not often be detected; for the disease is of its nature slow, causing prolonged incapacity, and recent exposure to dust inhalation must, therefore, be exceptional.

PNEUMONIA.

Prevalence.—If, as seems practically certain, dust inhalation is an influence which predisposes the bronchial mucosa to attacks of bronchitis; and if, as will be discussed later, dust inhalation can also modify the parenchyma of the lungs so that it is peculiarly prone to succumb to tuberculosis, then dust inhalation can hardly be expected to leave unaffected the intermediate zone of the lungs, the bronchioles and alveoli, the site of a distinct form of pulmonary disease, pneumonia. Yet dust inhalation as an influence predisposing to pneumonia is not widely recognised—indeed, neither Dr. P. Kidd in his Lumleian lectures (66) nor Sir James Barr in his address on pneumonia (63) allude to such an influence. But there is no *a priori* reason against it, for pneumonia has certain etiological characteristics in common with other respiratory diseases; bronchitis is probably due, as a final cause, to microbic invasion of the bronchial walls; and phthisis and pneumonia are certainly due to microbic invasion of those parts of the respiratory apparatus, which are the sites of these two diseases. A Committee appointed by the Royal College of Physicians has reported (64) that in the spread of phthisis among human beings inhalation of infected dust appears to be the more important means of infection, an opinion strongly supported by the recent work of Chaussé (101); and Dr. R. R. Armstrong holds (65) that "there seems reason to believe that all forms of pneumonia, not excepting lobar pneumonia, are inhalation infections." Dr. Kidd, it is true, considers (66a) that pneumonia is primarily a blood infection,

but while doing so he leans to Calmette's view that tubercle bacilli reach the lungs via the blood stream through the intestine; and so still recognises a common path of infection. Further, an interesting inverse relation exists between phthisis and pneumonia; thus Kidd, during his extensive clinical and post-mortem experience, has observed (66b) that "lobar pneumonia complicating declared and progressive tuberculosis of the lungs is exceedingly rare," and has raised "the question whether there is not some opposition between the two diseases." Now, this opposition is suggestive, for it is found in the mortality statistics of dusty industries (see Table 5); and, as will be seen later, pathology suggests, at any rate for those exposed to dust inhalation, a reason for this antagonism. Hence the prevalence of pneumonia among operatives exposed to certain dusts, but who do not suffer from dust-phthisis, and the absence of any prevalence of pneumonia among operatives who do suffer from dust-phthisis, point to dust exerting a definite influence upon the prevalence or non-prevalence of pneumonia.

In mortality statistics lobar pneumonia and broncho-pneumonia are grouped together, and this fact compels a conjoint consideration of these two forms of respiratory disease, although the special investigations, from which evidence as to a causal relationship between pneumonia and dust inhalation, is drawn, have generally had reference to the occurrence of lobar pneumonia. In late age-periods of life broncho-pneumonia often drops the curtain on cases of chronic bronchitis, and so swells the mortality figure for pneumonia in a group with a high death-rate from bronchitis; and the effect of this statistical method of considering the two diseases together must be kept in mind when mortality rates after the age of 55 years are examined.

Various authorities have maintained that a connection exists between dust inhalation and pneumonia. Merkel held the opinion (40d) that people employed in a dusty atmosphere suffer in a higher proportion from croupous pneumonia than others, Hirt considered (74) this disease is immediately caused by dust, and West states (47a) that "the victims of dust inhalation . . . are exposed to greater risk than others of acute pneumonia." Pneumonia among workers exposed to basic slag dust (pseudo-pneumonie à scories) has been carefully investigated by Monnier (68) and by Gautret (69). These observers have found

the pneumobacillus of Friedlander, and the pneumococcus present, either alone or together, in these cases, and also slag dust; and have described the symptoms as similar to, but more severe than those of ordinary pneumonia, and they look upon prognosis as particularly grave. Heim and Agasse-Lafont, when reviewing (41) these researches, admit the possibility of traumatic lesions to the respiratory organs, due to the inhalation *en masse* of caustic dust, lesions which prepare the way for the multiplication of microbes, usual inhabitants of the air passages, with the development of bronchitis and of pneumonia. Aufrecht, of Magdeburg, also states (96) that pneumonia is prevalent among slag workers, affecting in two years 48 per cent. of the men at one works; and he further found that the disease among these men had a case fatality of 30 per cent. In the same connection interest attaches to the inquiry carried out by Ballard for the Local Government Board into Middlesbrough pneumonia; he concluded (70) that "slag dust, to which the epidemic had been attributed, was not the cause of the pneumonia, but that, when from any cause pneumonia becomes epidemic, persons largely exposed to the inhalation of this dust may and do suffer more than persons not so exposed, and that the disease with them is of high fatality." This question of high case fatality has also been noted when pneumonia occurs among those exposed to other dusts; thus in the case of dressers of iron castings (see Table 5), their trade secretary told me that information of a member suffering from pneumonia is nearly invariably quickly followed by news of his death; while Watkins-Pitchford, when referring (44) to cases "suggestive of an acute broncho-pneumonia" among native gold-miners in the Transvaal, says, "in such cases the patient dies after a short illness," and he attributes the disease "to the inhalation of very large quantities of dust over a short period." On the gold-fields attention has been centred on the study of dust-phthisis, still Purdy, after an investigation in New Zealand and Tasmania, found (71) a high incidence of pneumonia in the mortality returns of quartz-mining districts, and he considers "the damage done to the lungs by inhalation of irritating dust makes a suitable soil for the pneumococcus"; and Summons gives (72) the mortality per 1,000 from pneumonia, 1905-06, among Bendigo miners as 2.74, as

Table 5. Death-Rates from Pneumonia for Certain Classes of Males distributed in Age-Periods.

Table 5. Death-Rates from Pneumonia for Certain Classes of Males distributed in Age-Periods.																				
CLASS	EXPOSURE TO DUST	PERIOD UNDER REVIEW	TOTAL OF DEATHS FROM PNEUMONIA	PER 1,000 LIVING AT AGE PERIOD						PERCENTAGE OF ALL DEATHS AT AGE PERIOD						PREVALENCE OF PHTHISIS	PREVALENCE OF BRONCHITIS	MEDIAN AGE AT DEATH FROM PNEUMONIA		
				PER 1,000 LIVING AT AGE PERIOD						PERCENTAGE OF ALL DEATHS AT AGE PERIOD										
				20-	25-	35-	45-	55-	65 AND OVER	20-	25-	35-	45-	55-	65 AND OVER					
Occupied and Retired Males	Country Air	1900-1902	34	814	0.39	0.59	1.17	1.81	2.65	4.35	8.7	9.4	10.8	9.7	7.5	4.1	—	—	50 to 51	
	Agriculturist Agricultural Districts	do.	1027		0.20	0.24	0.55	0.81	1.16	2.77	6.1	6.3	10.3	8.7	6.4	3.5	Low	Low	59 to 60	
	Fisherman	do.	57		0.11	0.52	1.06	0.73	1.64	1.98	1.6	6.2	8.6	4.7	6.0	2.0	Low	Low	46 to 47	
	Shipbuilding	do.	292		0.35	0.60	1.16	1.38	2.97	3.70	10.7	12.3	13.2	9.6	9.6	4.1	Low	Normal	52	
	Tailor	do.	392		0.26	0.34	0.70	1.64	2.10	3.94	6.4	6.2	6.5	8.2	5.6	3.5	In Excess	Normal	54	
	Shoemaker	do.	617		0.33	0.41	0.78	1.49	2.07	3.76	6.3	6.2	7.5	8.1	6.1	3.5	In Excess	slight excess	56 to 57	
	Coal Miners	Durham & Northumberland	do.	222		0.15	0.25	0.48	1.36	1.89	5.13	3.1	5.4	7.1	9.9	6.0	3.3	Low	Low	51
		Nottingham & Derbyshire	do.	194		0.19	0.17	0.72	0.89	2.11	6.09	5.0	5.1	12.0	7.9	6.7	4.1	Low	some excess late in life	49
		Coal	do.	409		0.43	0.73	1.20	1.93	3.74	6.05	8.6	12.6	13.5	12.1	9.4	5.8	Low	Excess late in life	43 to 44
		Monmouth & South Wales	do.	353		0.54	1.01	1.55	2.82	3.13	6.92	11.1	16.7	17.2	16.2	12.1	5.1	Low	Excess	44 to 45
Lancashire		do.	149		0.60	0.36	1.02	1.23	2.27	4.72	14.8	9.0	15.0	9.6	9.5	4.8	Low	Normal	48 to 49	
Brick Plain Tile Terra Cotta Maker		do.	264		0.23	0.55	1.11	1.67	2.21	5.49	4.5	10.5	12.0	9.3	5.4	3.7	Normal	Normal	53	
Wool Worsted Manufacture		do.	599		0.46	0.63	1.08	2.21	4.02	6.21	10.4	11.3	10.8	10.4	8.5	4.6	slight excess	In Excess	49	
Cotton Manufacture		do.	256		0.44	0.33	1.20	2.10	2.92	5.41	11.2	7.4	11.3	9.9	8.1	4.5	Normal	In Excess	53 to 54	
Sawyer & Wood Turner Cooper etc.		do.	83		0.20	1.56	1.00	2.60	3.90	6.92	5.0	20.2	5.7	8.1	6.9	5.1	In Excess	In Excess	51 to 52	
Cutler Scissors Maker		do.	119		0.47	0.41	1.24	2.37	3.53	7.00	12.5	7.4	8.3	7.3	6.0	5.2	In Excess	In Excess	48 to 49	
Potter Earthenware etc. Manufacture	do.	19		0.69	0.22	0.86	2.23	2.90	3.93	12.5	1.4	3.2	5.8	3.9	2.5	In Excess	In Excess	48 to 49		
Tin Miner	do.	1898-1912	91		—	—	—	—	—	—	—	—	—	—	—	—	Low	In Excess	45	
Dressers of Iron Castings	Sand, Clay, Emery, Metal, Charcoal	1908-1912	31		—	—	—	—	—	—	—	—	—	—	—	—	In Excess	In Excess	47	
	Metal & Quartz	do.	45		—	—	—	—	—	—	—	—	—	—	—	—	In Excess	In Excess	57 to 58	
	Metal, Bone, Emery Linen, etc.	1910-1912	147		—	—	—	—	—	—	—	—	—	—	—	—	In Excess	In Excess	53	
	Quartz	do.	49		—	—	—	—	—	—	—	—	—	—	—	—	not excessive	Low	62 to 63	
	Calcium Carbonate	do.	67		—	—	—	—	—	—	—	—	—	—	—	—	Some excess late in life	In Excess	42 to 43	
	Sand, Clay, Emery, Metal, Charcoal	do.	36		—	—	—	—	—	—	—	—	—	—	—	—	In Excess	Low	51 to 52	
	Slate	do.			—	—	—	—	—	—	—	—	—	—	—	—				
	Stone, Gutter Dresser Mason	Sandstone				—	—	—	—	—	—	—	—	—	—	—	—			
		Limestone				—	—	—	—	—	—	—	—	—	—	—	—			
		Metal Dressers and Glaziers				—	—	—	—	—	—	—	—	—	—	—	—			
Slate Quarrier Worker					—	—	—	—	—	—	—	—	—	—	—	—				

ENGLAND AND WALES

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* Calculated from Supplement to Sixty-Fifth Annual Report of Registrar-General for Births, Deaths and Marriages in England and Wales, Part II, 1908. Wyman & Sons. (Cd. 2619.)

† Calculated from data given in Annual Report on the Health of Sheffield for 1913, pp. xiii-xiv.

‡ Calculated from data courteously supplied by General Register Office.

NOTE.—All figures in excess of the standard for Occupied and Retired Males are underlined.

compared with 1.21 for adult males in Victoria, 1903-05; but, as neither observer states the age-distribution of the pneumonia cases, the usual contradistinction between the incidence of pneumonia and phthisis when due to dust, though it may be surmised, cannot be definitely asserted. This contradistinction, however, according to Bremridge's observations quoted (92) by Oliver, exists on the Kolar gold-field in India, where "miners' phthisis is remarkable rather for its absence than its presence," but "a large proportion of the miners die from pneumonia," induced, however, it is thought by other causes than dust inhalation. Similarly, Dr. Haldane informs me, miners' phthisis is not known in the gold-mining district of Cripple Creek, Colorado, where, though dust is freely generated by rock-drills, the workings are not in

action of dust his lungs quickly develop the same condition as was seen in these animals, and therefore he is very liable to attacks of the organism of acute pneumonia." In later years fibrosis, which, as will be shown later, is inimical to the occurrence of pneumonia, developed, and synchronously phthisis increased and pneumonia diminished.

The figures of Table 6 show well the effect of initial exposure to quartz dust, and the altered mortality which follows prolonged exposure. Another industry in which dust is generated, and in which pneumonia has been stated to be unusually prevalent, is the slate trade; in this industry, according to evidence referring to Merionethshire slate quarries given (76) by Dr. Evans and by Dr. Richard Jones in 1895, and reiterated (77) by the latter in 1912, pneumonia is unusually prevalent

Table 6. DEATHS FROM PNEUMONIA AND PHTHISIS AMONG GOLD MINERS IN WESTERN AUSTRALIA.					
Cause of Death		1900-04		1905-09	
		Age-Period		Age-Period	
		15 TO 44	45 AND OVER	15 TO 44	45 AND OVER
Pneumonia	Number	78	49	44	38
	Percentage of All Deaths from All Causes	13.2		9.3	
	Proportion	1.59	1.00	1.16	1.00
Phthisis	Number	49	23	57	48
	Percentage of All Deaths from All Causes	7.5		11.9	
	Proportion	2.13	1.00	1.19	1.00

quartz, but in a hard, siliceous rock. On other American gold-fields, where the gold is in quartz, miners' phthisis appears to exist. Pneumonia at Cripple Creek, though no information is to hand as to its prevalence, is recognised to be very fatal, but this is ascribed to the elevation of the district—10,000 feet above sea-level. In the gold-mining industry, however, the best evidence of the occurrence of pneumonia comes from Western Australia (73), where Dr. Cumpston, the Royal Commissioner of 1910, reports that about 1900 "many men took on machine work for the first time (with excessive exposure to dust), and therefore the death-rate from pneumonia was high"; after finding that experimental exposure of animals to massive inhalation of dust produced a pneumonic condition of the lungs, Dr. Cumpston concluded "that when a young man first becomes exposed to the

among rockmen, miners, and labourers who work underground in the slate quarries, while phthisis is not in excess. In France fibrosis of the lungs, attributed by Dr. Sejourner to dust inhalation, has been described (97) among slate workers at Fumay; but phthisis does not seem to affect these workers so much as bronchitis and pneumonia. More recent statistics for 1910-12, relating to slate workers as a whole in England and Wales, courteously placed at my disposal by the General Register Office, do not, however, disclose any undue prevalence of pneumonia. No explanation can at present be given of the discrepancy. Other evidence may be quoted as establishing a relation between pneumonia and dust inhalation; for example, Dr. Bensusan, after eighteen years' experience in Johannesburg, tells me that, whatever be the time of year, a sandstorm in that city is always followed by

an outbreak of pneumonia, and that he is accustomed on the occurrence of such a storm to set aside beds in the hospital for the reception of the inevitable crop of cases.

The most interesting statistics, however, are those from the coal trade, which have already been referred to when bronchitis was under discussion. In certain districts, viz., the coal-fields of Durham and Northumberland, and of Derbyshire and Nottinghamshire, the death-rate from pneumonia is unusually low, while in other districts, viz., the coal-fields of Lancashire, and of Monmouthshire and South Wales, it is unusually high. Unfortunately for the present purpose, coal-miners are exposed to dust of coal as well as that of intervening strata; and since the low death-rates from phthisis experienced by coal-miners in every country (88) compel us to admit that coal-dust has a definite inhibitory effect upon the prevalence of phthisis, the presence of the usual inverse relation between the prevalence of phthisis and of pneumonia loses its significance. Interest, however, attaches to the pneumonia death-rate, the proportionate mortality for which among Lancashire miners is high for every age-period, an evil distinction only shared in Table 5 by dressers of iron-castings, among whom also the phthisis mortality, though not so low as among the miners, is not high.

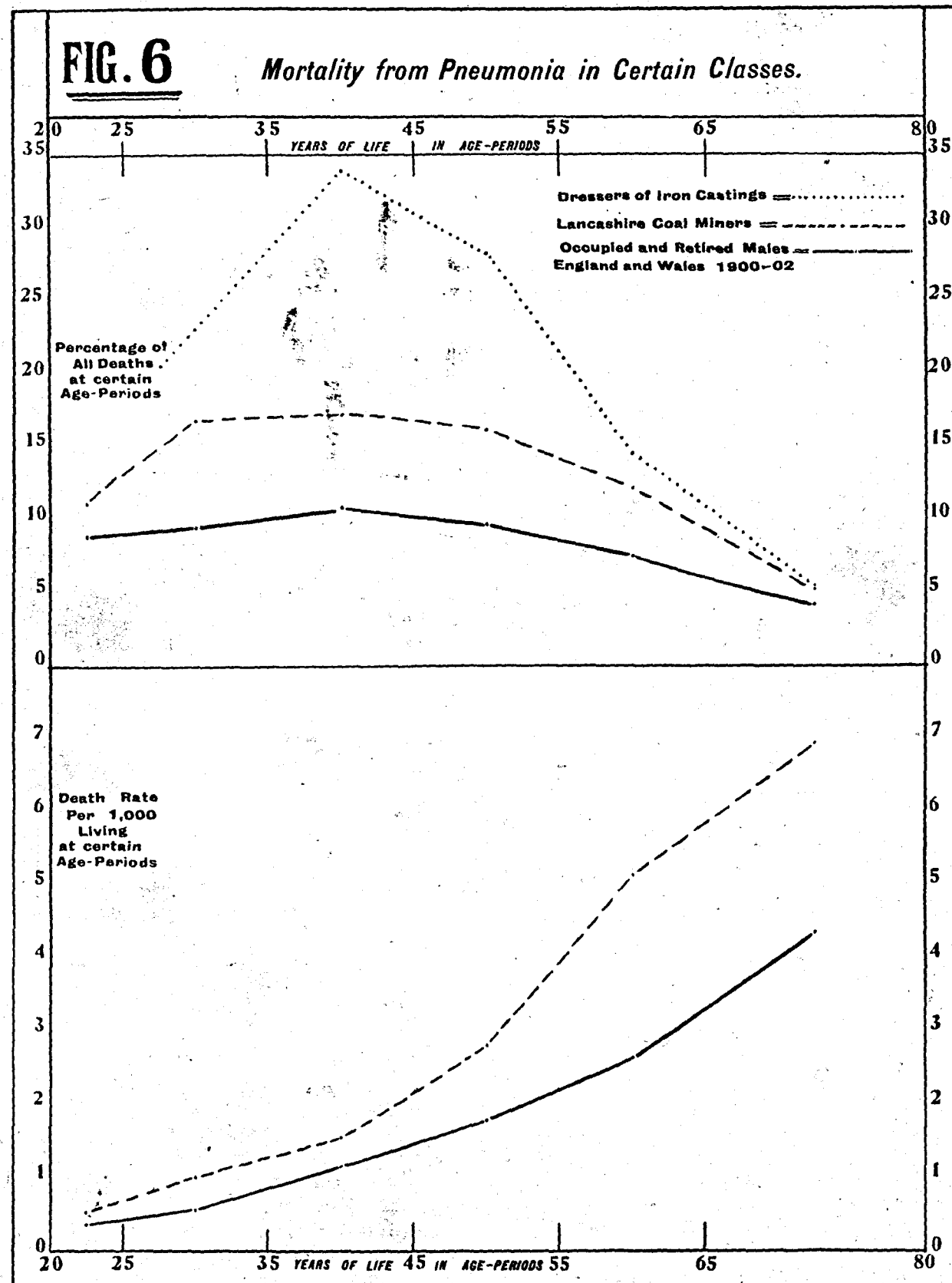
The dust of dressing shops is of interest in that it contains a high proportion, 79 per cent., of free silica, and yet exposure to it has not been found (as will be shown in the next lecture to be usual when free silica is present) to be associated with a high phthisis mortality, though it is with a high mortality from bronchitis and pneumonia. Another dust containing free silica, which does not seem to predispose to phthisis, is that of clay mixed with quartzite, used in the manufacture of certain refractory bricks; but such evidence as can be obtained suggests that exposure to this dust is associated with a high mortality from bronchitis and pneumonia. Similarly dust of Altoft's shale, which is known to contain over 30 per cent. of free silica, does not seem to predispose to phthisis, but its relation to the occurrence of other respiratory diseases is not known. These three dusts are so far similar that they contain free silica associated with clay in varying proportions. In the present state of our knowledge speculation is idle as to why, as the facts seem to indicate, the presence of clay modifies the

action of silica in predisposing to phthisis, while leaving in relief its power of predisposing to pneumonia and bronchitis, especially as the point is undecided whether the same sequence of events follows the inhalation of similar dust in certain branches of the pottery industry. I may, however, say that certain investigations, now being carried on by Dr. H. C. Ross, suggest that this action of clay in modifying the influence of silica dust, which appears to be similar to that exerted by coal, depends on the presence of certain organic constituents in these materials.

Conclusion.—Pneumonia appears to be predisposed to by the inhalation of those dusts which are associated with an undue prevalence of bronchitis; some of these dusts are associated with an excessive mortality from phthisis, and some are not. And when the phthisis mortality is not in excess, the pneumonia mortality is in excess throughout occupational life; but when the phthisis mortality is in excess, this excess occurs at those later age-periods which represent prolonged exposure, while the excessive mortality from pneumonia occurs at those earlier age-periods which represent initial exposure.

Causation.—The inflammatory processes in the lungs which constitute an attack of pneumonia are caused by the multiplication of micro-organisms in the pulmonary alveoli and bronchioles; and the pneumococcus of Fraenkel is the chief though not the only micro-organism which can initiate such inflammation. This pneumococcus is a normal inhabitant of the upper air passages, and any influence which interferes with the vitality of the lower air passages may be expected to increase the probability of microbial invasion, whether that influence be alcohol impairing ciliary action (41a), or cold, or traumatism, either acute, due to local injury, or chronic, due to dust inhalation.

As in the case of bronchitis, the curve representing the mortality from pneumonia at various age-periods among those exposed to dust inhalation sufficiently resembles, though at a higher level, that for the general population to suggest that the influence which determines the mortality it represents acts in a similar way to the influence which determines the incidence of the disease among the general population—i.e., it is an influence which increases the liability to pneumococcal invasion (see fig. 6).



Whether we agree with Kidd (66a) that pneumonia arises primarily as a blood infection, or with Armstrong (65) that all forms of pneumonia are inhalation infections, the conclusion still holds good that some predominating influence is at work which produces in an exaggerated form the same statistical type of mortality among those exposed to the inhalation of certain dusts.

The prevalence of pneumonia in certain dusty occupations, already alluded to, suggests that inhalation of dust of the following materials predisposes to the disease, viz., basic slag, some forms of slate, the strata in which coal is found, silica when mixed with clay, cotton, wood; but that the disease is not found in excess among those exposed to the inhalation of dusts composed of pure coal, clay, or of those dusts associated at certain age-periods with excessive phthisis mortality; that is to say, pneumonia is probably above the average among all persons exposed to dusts which cause bronchitis with the exception of persons exposed to dusts which also cause phthisis, and even among these persons it is above the average during the earlier years of exposure. This latter fact probably indicates that the pathological changes, to be discussed later, which pave the way for tubercular infection, are inimical to pneumonic infection; and in the fact that those changes involve to a large extent the obliteration of the alveolar spaces and bronchioles, the areas specially concerned in pneumococcal inflammation, may lie the cause for the inverse relation noted between the prevalence of pneumonia and phthisis in dusty industries. Moreover, the occurrence of a high death-rate from pneumonia at early age-periods in such occupations as the manufacture of pottery, tin-mining, and dressing sandstone, in which phthisis is prevalent in later age-periods, suggests that, if such obliteration of the special pneumonic areas did not occur, the pneumonia death-rate would continue excessive throughout life. Pneumonia, then, is predisposed to by influences which interfere with the normal function of the alveoli and smaller bronchioles, as long as these influences do not obliterate these structures. The bronchi and larger bronchioles, on the other hand, remain patent even in pronounced conditions of pulmonary fibrosis, and their damaged mucosa falls a prey to bronchitis. But the tubercle bacillus for which the seat of election is the paren-

chyma of the lungs, rather than the lining epithelium, finds in fibrosed tissue with its impaired vitality suitable medium for growth. Thus is provided some explanation of the diverse mortality rates from respiratory diseases experienced in dusty industries, all dusts which are insoluble in the fluids found in the lungs, and which are of sufficiently small size to be inhaled, impair the functional activity of the respiratory mucosa, and are influences predisposing to bronchitis and pneumonia, while of these dusts those, which by their presence in the parenchyma of the lungs, determine fibrous formation with obliteration of the seat of election of pneumonic activity, cease after a time to predispose to pneumonia, but continue to predispose to bronchitis, and at the same time introduce a new factor by preparing the way for tubercular infection.

Before accepting a purely mechanical explanation of the occurrence of pneumonia in dusty industries, the possibility that other properties of dust or other adverse influences are necessary to reinforce the effect produced by the presence of inert particles of dust must be considered. Briault exposed (78) guinea-pigs, some to silica dust, some to nitrous fumes, some to silica dust and nitrous fumes, but only with the combined exposure obtained marked symptoms of acute pulmonary inflammation. Similarly Prof. Beattie tells me that in his extensive experiments (77a) on animals with many kinds of inert dust, though he obtained marked congestion of the vessels of the alveolar walls and some exudation, he did not produce definite pneumonia which could be attributed to dust inhalation. In basic slag dust Gautret considers (69) the lime and phosphoric acid present may reinforce the mechanical action of the dust particles; in other dusts, e.g., that of iron dressers' shops, such other superadded influences as from time to time lower the general resistance of individuals, e.g., illness, over-fatigue, or alcohol, may determine the onset of pneumonia, a theory held by Brouardel.

An attack of pneumonia is probably determined by either (i) an invasion of an army of microbes too large to be resisted by normal individuals, e.g., epidemic pneumonias, and pneumonia among non-resistant South African natives, or (ii) such acute interference with the ciliary activity of the pulmonary epithelium that a normal amount of

infection cannot be thrown back, e.g., massive dust inhalation, and, according to Cesa Bianchi (41a), indulgence in alcohol, or (iii) chronic interference with the activity of the pulmonary epithelium, for instance by dust, so reinforced by other adverse influences, e.g., illness, over-fatigue, nitrous fumes, that a normal amount of infection cannot be resisted; and these determining influences may act with varied power and in any combination.

Clinical Symptoms.—The acute nature of this disease prevents those affected from continuing at work; for this reason I have not been able to study the disease at first hand. Others, however, have noted, particularly Ballard, Monnier, and Gautret, in their respective investigations into basic slag pneumonia, that the incidence of the disease is not so much increased as is the case fatality; and, as already mentioned, a high case fatality prevails among dressers of iron castings. Gautret says that in cases of basic slag pneumonia the symptoms are more profound, accompanied at times by severe or even fatal hæmoptysis, the affected area is more diffuse and more often bilateral than in ordinary cases; and that convalescence is slow and accompanied with mucopurulent sputum suggestive of phthisis, but that tubercle bacilli are not found, while final recovery negatives this suggestion. Cases of pneumonia, however, in the origin of which dust has played no part may exhibit such characteristics; and apart from this increased case-severity I have been unable to find any definite indication that pneumonia as it occurs among those exposed to dust differs clinically in any way from pneumonia in general, nor indeed, if the causative influence suggested above is accepted, is such difference to be anticipated.

Differential Diagnosis.—Just as in the case of bronchitis, the connection between the disease and dust inhalation must depend upon an intimate knowledge of the occupation followed, of the exposure to dust, and of the mortality prevalent in that occupation. A correct diagnosis is of importance because, with the known tendency to a fatal termination, every case from its onset, however apparently slight, must be considered serious and treated accordingly. Detection in the sputum of particles of dust known to be associated with pneumonia may assist in diagnosing the occupational origin of the attack.

Pathology.—Theoretically excessive exposure to dust might be expected by mass influence to be followed by excessive secretion from and proliferation of the alveolar cells, thus causing an acute form of broncho-pneumonia; and such cases have been described (44) by Watkins-Pitchford in which "the lungs are found post-mortem, to be deeply congested, oedematous, and finely mottled with islands of pigmentation, but exhibit none other of the characteristic appearances of fibrosis," and he ascribes these cases to the inhalation of very large quantities of dust over a short period. Such cases, however, are rare.

Probably when exposure has been prolonged signs of chronic bronchitis will always be found associated with those of pneumonia, but, except in so far as dust particles may be detected in the tissues after death, as, for instance, in Watkins-Pitchford cases, in which "microscopic examination with polarised light shows the connective tissue to be laden with siliceous particles and the alveoli to be distended with serous exudate and catarrhal cells," and in those of Gautret in which basic slag dust was found, no pathological condition has been described which differentiates pneumonia as it occurs in dusty industries from pneumonia as it occurs in the general population.

(To be continued.)

LIST OF REFERENCES.

- Second Report of the Royal Commission on Metalliferous Mines and Quarries, 1914, pp. 133-155. Wyman & Sons, Ltd. (Cd. 7478.)
- Ibid. p. 141.
- Ibid. p. 144.
- Chemical Pathology, 1907, p. 392. H. G. Wells. W. B. Saunders & Co., Philadelphia.
- Prepared from Supplement to Sixty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales, part II., 1908. Wyman & Sons, Ltd. (Cd. 2619.)
- The Sootfall of London. The Lancet, 6th Jan., 1912.
- Coal Smoke Abatement in England. Dr. Louis Asther. Journal of Royal Sanitary Institute, Vol. xxviii., 1908, p. 89.
- Antiquity of Man. Sir Charles Lyell.
- Origin of the Aryans, p. 181. Dr. Isaac Taylor.
- The Date of Grime's Graves and Cissbury Flint Mines. Reginald Smith. Society of Antiquaries, 9th May, 1912.
- Minutes of Evidence. Royal Commission on Metalliferous Mines and Quarries, Vol. II., 1914, appendix J., p. 262. Wyman & Sons, Ltd. (Cd. 7477.)
- Annales d'Hygiène Publique. T. Sixième, p. 10. Benoiston de Chateaufort, 1831. Paris.
- Œuvres complètes d'Hippocrate avec le texte Grec en regard, par E. Littré, Vol. 5, 1846, p. 167. J. B. Baillière, Paris.
- A Treatise of the Diseases of Tradesmen, written in Latin by Bern. Ramazzini, Professor of Physic at Padua, and now done in English by Dr. James, 1705, p. 14. London.
- Ibid. p. 163.
- Ibid. p. 30.
- Ibid. p. 175.
- Ibid. pp. 170-171.
- Cat. Plinii Secund. Historia, Naturalis, lib. vii., sec. 1.
- Ibid. lib. xxxiii., sec. xi.
- De Re Metallica, Georgii Agricola, 1557. Froben Basil.
- Bericht von Bergwerken, durch G. E. Lohse, folio, 1690, p. 56. Stockholm und Hamburg.
- The Staffordshire Potter, by Harold Owen, 1901, p. 276. Grant Richards.
- Trans. Med. Chirurg. Soc. Edinburgh, Vol. I., p. 373, 1824. Alison.
- My Schools and Schoolmasters, Hugh Miller, 1869. Twelfth Edition. William P. Nimmo, Edinburgh.

- The Effects of Arts, Trades and Professions, C. Turner Thackrah, 1832, Second Edition, p. 99. Baines & Newsom, Leeds.
- Ibid. p. 90.
- Ibid. p. 55.
- Ibid. pp. 85-86.
- Ibid. p. 89.
- Ibid. p. 95.
- La Tuberculose chez les ouvriers en soie. Thèse, Dr. Pierre Givré, 1889. Lyon.
- Ibid. pp. 141-2.
- Ibid. pp. 92-3.
- The Vital Statistics of Sheffield, G. Calvert Holland, 1843, p. 192. Robert Tyas, London.
- Ibid. p. 196 and p. 201.
- Report of the Commissioners appointed to inquire into the conditions of Mines in Great Britain 1864, appendix B., pp. 347-431. Eyre & Spottiswoode.
- Ibid. p. 3.
- On Stone-Masons' Phthisis, G. L. Gulland, M.D., March, 1909. Edinburgh Medical Journal.
- Report on the Health of Cornish Miners, 1904, p. 21. Eyre & Spottiswoode. (Cd. 2091.)
- Ibid. p. 18.
- Ibid. p. 20.
- Ibid. p. 24.
- Ibid. p. 19.
- Archiv. für pathog. Anatom. und Physiol. und für klin. Medic. von Virchow, Bd. xxxix., p. 442.
- On French Millstone-makers' Phthisis. Medico-Chirurgical Review, Vol. 25, 1860, pp. 214-224. T. B. Peacock. And Trans. Pathol. Soc. London, Vol. xii., 1860, T. B. Peacock, and Ibid., Vol. xvii., 1866.
- Papers relating to the sanitary state of the people of England, General Board of Health, 1858, p. 132. Eyre & Spottiswoode.
- Ibid. p. 63.
- Third Report of the Medical Officer of the Privy Council, 1860, Appendix VI.
- Ibid. p. 133.
- Ibid. p. 142.
- Ibid. pp. 174-5.
- Ibid. pp. 151-2.
- Ibid. p. 119.
- Fourth Report of the Medical Officer of the Privy Council, 1862, Appendix IV. Eyre & Spottiswoode.
- Ibid. p. 145.
- Ibid. p. 177.
- Ibid. p. 159.
- Ibid. p. 162.
- Ibid. p. 166.
- Diseases of Occupation, J. T. Airdge, 1892, p. 245. Percival & Co.
- Ibid. p. 297.
- Ibid. p. 313.
- Ibid. pp. 298-9.
- Ibid. p. 252.
- Effet des poussières industrielles dans la production des affections broncho-pulmonaires, Hejrm et Agasse-Lalont. Trans. XVIIIth Internat. Congr. of Medicine, 1913, sec. xviii., pt. ii.
- Ibid. Discussion, p. 23.
- Presse Méd. 1st Sept., 1906, Calmette.
- Lead Poisoning and Lead Absorption, Legge and Goadby, 1912, p. 102. Edward Arnold.
- The Industrial Diseases of South Africa, Watkins-Pitchford, 1914. The Med. Journ. of South Africa.
- Floating Matter of the Air, John Tyndall, 1881, pp. 26-7. Longmans, Green & Co.
- Ibid. p. 37.
- The Ash of Silicotic Lungs, John McCrae, 1913. The South African Institute for Medical Research. Horner & Co., Johannesburg.
- Diseases of the Organs of Respiration, S. West, Vol. i., 1902. Griffin & Co., Ltd.
- Ibid. p. 196.
- Report of Royal Commissioner on pulmonary diseases amongst Miners, 1910, Perth, Western Australia.
- Ibid. p. 68.
- Miners' Phthisis at Bendigo, W. Summons, 1907. Stillwell & Co., Melbourne.
- Ibid. p. 38.
- Ibid. p. 35.
- Flax Mills and Linen Factories, E. H. Osborn, 1894, pp. 18-21. (Cd. 7287.) Eyre & Spottiswoode.
- Mrs. A. G. Finlaison's Report on Sickness and Mortality, Friendly Societies' Return, 1853, p. xxi.
- Sickness and Mortality Experience of the I.O.F. Manchester Unity during the Five Years, 1893-1897, 1903, p. 66. Manchester.
- Annual Report of the Chief Inspector of Factories for 1908, pp. 203-5. Wyman & Sons, Ltd. (Cd. 4664.)
- Industrial Accidents and Trade Diseases in the United States, F. L. Hoffman. Transactions of the Fifteenth International Congress on Hygiene and Demography, Vol. I., Part II., pp. 764-769, 1913. Washington.
- The Hygienic Aspect of the Coal-mining Industry, Milroy Lectures, 1914, F. Shuffelbotham, lecture iii.
- Monographie hygiénique de la fabrication du plâtre en France, Hébert, Maute, and Heims, 1912. Duruy et Cie., Paris.
- Report on the Prevalence of Phthisis among Quarry Workers and Miners, S. Barwise, 1913. Derby County.
- Royal Commission on Metalliferous Mines and Quarries, Minutes of Evidence, Vol. III., Appendix P., 1914. Wyman & Sons, Ltd. (Cd. 7478.)
- Annual Report of the Chief Inspector of Factories for 1911, pp. 203-5. Wyman & Sons, Ltd. (Cd. 6239.)
- Ibid. pp. 230-1.
- Jahresberichte der Gewerbe-Aussichtsbeamten und Bergbehörden für das Jahr 1911, pp. 384-419. Berlin.
- On the Mortality of Flax Workers, C. D. Purdon, 1873.
- Jute, H. J. Wilson; Dangerous Trades, edited by T. Oliver, 1902, p. 669. John Murray.
- An Address on Pneumonia, Sir James Barr. British Medical Journal, Jan. 10th, 1914.
- Report to the Royal College of Physicians on the Infectivity of Pulmonary Tuberculosis. British Medical Journal, April 11th, 1914.
- The Experimental Production of Pneumonia, R. B. Armstrong. Supplement to British Medical Journal, July 18th, 1914.
- The Lumleian Lectures, Dr. P. Kidd. Lancet, Vol. I., 1912.
- Ibid. p. 1590.
- Ibid. p. 1668.
- Les Pneumonies à scories, Monnier. Gaz. Med. de Nantes, Nov. 12th, 1898.
- Les Pneumonies à scories, Gautret. Thèse de Paris, 1899.
- Final Report of Departmental Committee on Certain Miscellaneous Dangerous Trades, p. 13, 1899. Eyre & Spottiswoode. (Cd. 9509.)
- The Cause, Effect, Incidence and Prevention of Pneumoconiosis of Quariz Miners, J. S. Purdy. The Practitioner, February, 1912.
- Miners' Phthisis at Bendigo, W. Summons, 1907. Stillwell & Co., Melbourne.
- Report of the Royal Commissioner on Pulmonary Diseases amongst Miners, p. 69, 1910. Perth, Western Australia.
- Die Staubinhalations-Krankheiten, Dr. Ludwig Hirt. Die Krankheiten der Arbeiter, Erster Theil. Breslau, 1871.
- Diseases of the Lungs, Powell and Hartley, Fourth Edition, 1911. H. K. Lewis, London.
- Report of Departmental Committee upon Merionethshire Slate Mines, 1895. (Cd. 7692.) Eyre & Spottiswoode.
- Minutes of Evidence, Royal Commission on Metalliferous Mines and Quarries, Vol. III., 1914, p. 115. Wyman & Sons, Ltd. (Cd. 7478.)
- Ibid. pp. 145-154.
- Ibid. p. 188.
- Ibid. p. 236.
- Ibid. pp. 181-189, and Appendix P.
- Recherches expérimentales sur les conditions physiologiques du travail des ouvriers tailleurs, 1911. Briault. Thèse du Paris.
- Report of Medical Officer of Health for the City of Aberdeen 1909, p. 107.
- Report on the prevalence of Lung Diseases among the Workers at Grinshill Quarries, J. Wheatley, 1912. Shrewsbury.
- Report of a Commission on Miners' Phthisis and Pulmonary Tuberculosis in South Africa, 1912, pp. 7-10. Cape Town.
- Report of Medical Officer of Health of Johannesburg, 1st July, 1912, to 30th June, 1913. Charles Porter, M.D., p. 20. Johannesburg.
- Transactions of the Pathological Society of London, Vol. xx., 1869.
- Ibid., Vol. xvi., 1865, pp. 59-60.
- Science from an Easy Chair, a second series, 1912, Sir Ray Lankester, pp. 191-2. Adlard & Son, London.
- Rabelais, A new translation, W. F. Smith, 1893, Vol. i., chap. xxix., p. 343. Alexander P. Watt.
- Die Hygiene des Bergmannes, Halle, 1903. Goldmann.
- The so-called Anthracosis and Phthisis in Coal-miners, R. S. Trotter. British Medical Journal, 23rd May, 1903.
- The Relation between Anthracosis and Pulmonary Tuberculosis, by J. M. Wainwright and H. J. Nichols, American Journal of the Medical Sciences, 1905, Vol. cxxx., pp. 403-414.
- Miners' Phthisis, Sir T. Oliver, British Medical Journal, 12th Sept., 1903.
- Weavers' Cough, Annual Report of the Chief Inspector of Factories for 1913, p. 150. Wyman & Sons, Ltd. (Cd. 7391.)
- Diseases of the Lungs from Mechanical Causes, G. Calvert Holland, 1843, p. 23. John Churchill, London.
- Ibid. pp. 36-7.
- Ibid. p. 60.
- Diseases of Occupation, Sir T. Oliver, p. 294. 1907. Methuen & Co.
- Report of Departmental Committee on Compensation for Industrial Diseases, Minutes of Evidence, pp. 197-202, 1907. (Cd. 3496) Wyman & Sons, Ltd.
- Pneumoconiosis, Sir T. Oliver. System of Medicine, Albutt and Rolleston, Vol. v., 1909, p. 469. Macmillan & Co., Ltd.
- Ibid. p. 462.
- Staubinhalation und Staubmetastase, Julius Arnold, 1883.
- Erkrankungen des Respirationsapparates, E. Aufrecht, Nothnagel's Specielle Pathologie und Therapie, Bd. xiv.
- La Maladie des Ardoisiers: la Schistose, Reims, 1900. Imprimerie. Matot-Braire.
- Proceedings of Royal Society of Medicine, Electro-Therapeutical Section, Vol. VI., 1914, pp. 93-98.
- Proceedings of Royal Society of Medicine, Pathological Section, Vol. VII., part III., 1914, Tuberculoïd Pneumoconiosis, S. G. Shattock.
- The Relation of Industrial and Sanitary Conditions to Pauperism, Mr. A. D. Maitland and Miss Rose Squire, p. 109, and pp. 125-6 1909. Wyman & Sons, Ltd. (Cd. 4653.)
- Annales de l'Institut Pasteur, Paris, 1914, xxviii.
- Staubinhalationskrankheiten der Lungen, p. 171, Zenker.
- Deutsch. Archiv. für klin. Medic. Bd. 2, 1867. Ibid. pp. 116-172.

RECENT PUBLIC HEALTH
LITERATURE.**Alcoholism.**

CROTHERS (T. D.). Symptoms of insanity in inebriates. *Interstate Med. Journ.*, 1915, xxii, 233.—HOGG (F. S. D.). The after-history and care of inebriates. *Brit. Journ. Inebriety*, 1914-15, xii, 195.—NEWTON (J.). Alcohol and the war. The action of our Allies. *Brit. Journ. Inebriety*, 1914-15, xii, 204.—STRACHOM (J.). The alcohol poison and its victims. *Edinb. Med. Journ.*, 1915, N.S., xiv, 172.

Cancer.

GAYLORD (H. R.). Etiology of cancer in the light of recent cancer research. *Journ. Amer. Med. Assoc.*, 1915, lxi, 968. *Idem.* The relation of cancer research to the clinical aspects of cancer. *Murphy's Clinics*, 1915, vi, No. 1, p. 39.

Cerebro-Spinal Fluid.

FRAZIER (C. H.). The cerebro-spinal fluid in health and disease. *Journ. Amer. Med. Assoc.*, 1915, lxi, 1,119.

Cholera.

GOFF (A. P.) and DENNEY (O. E.). Clinical observations on Asiatic cholera in Manila in 1914. *Journ. Amer. Med. Assoc.*, 1915, lxi, 1,148.

Feeble-mindedness.

DUNSTON (J. T.). The problem of the feeble-minded. *South African M. Rec.*, 1914, xii, 330; 345.

Hygiene, Public.

ROSENAU (M. J.). Courses and degrees in public health work. *Journ. Amer. Med. Assoc.*, 1915, lxi, 794.

Ice-Cream.

BAHLMAN (C.). Ice-cream studies in Cincinnati. *Amer. Journ. Pub. Health*, 1914, iv, 1,009.

Leprosy.

BAYON (H.). Leprosy: A perspective of the results of experimental study of the disease. *Ann. Trop. Med. and Parasitol.*, 1915, ix, 1.

Malaria.

SCOTT (J.). Studies in malaria. *Indian Med. Gaz.*, 1915, l, 7; 47.—WALKER (E. L.) and BARBER (M. A.). Malaria in the Philippine Islands. *Philippine Journ. Sci.*, 1914, ix, B. 381.—WILLETS (D. G.). Malaria in the Philippine General Hospital, Manila, P. I., during the fiscal year, 1913. *Philippine Journ. Sci.*, 1914, ix, B. 444.

Milk.

BRACY (H. A.). A milk-borne epidemic of tonsillitis in tuberculous patients. *Journ. Amer. Med. Assoc.*, 1915, lxi, 1,127.—HENDERSON (J. B.) and MESTON (L. A.). The freezing

point of milk. *Chemical News, Lond.*, 1914, cx, 261; 275; 283.

Mortality, Infantile.

GRAY (T. N.). The reduction of infant mortality: How can it best be accomplished? *Pediatrics*, 1915, xxvii, 60.

Mosquitoes.

SCHWETZ (J.). Preliminary notes on the mosquitoes of Kabinda (Nomami), Belgian Congo. *Ann. Trop. Med. and Parasitol.*, 1915, ix, 163.

Motherhood.

PRITCHARD (E.). The scope and functions of schools for mothers. *Pediatrics*, 1915, xxvii, 50.

Overcrowding.

HENDERSON (C. R.). Crowding, in relation to the health of working people. *Bull. Amer. Acad. Med.*, 1914, xv, 350.

Protozoa.

GOODEY (T.). Investigations on protozoa in relation to the factor limiting bacterial activity in soil. *Proc. Roy. Socy., Lond.*, 1914-15, lxxxviii, Ser. B. 437.

Psychiatry.

CLARKE (C. K.) and Others. Psychiatry as a public health problem. *Canada Lancet*, 1915, xlviii, 386.

Rat Plague.

WILLOUGHBY (W. M.). Rat plague; and the powers of a medical officer of health. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 132. *Discussion*, p. 135.

Recruits.

PEMBREY (M. S.). Tall versus short men for the army. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 105. *Discussion*, p. 109.

Schools.

SMITH (W. H.). School sanitation. *Public Health, Michigan*, 1915, N.S., iii, 71.

Seamen.

JONES (J. H.). Diseases incident upon seamen, and their prevention. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 124. *Discussion*, p. 131.

Ships, Hygiene of.

WILLIAMS (H.). Insanitary conditions on ship-board. *Journ. Roy. Sanit. Inst.*, 1915, xxxvi, 118.

Syphilis.

BLAISDELL (J. H.). The menace of syphilis to the clean living public. *Boston M. and S. Journ.*, 1915, clxxvii, 476.—HABERMAN (J. V.). Hereditary syphilis in connection with clinical psychology and psycho-pathology. *Journ. Amer. Med. Assoc.*, 1915, lxi, 1,141.—VEDDER (E. B.) and HOUGH (W. H.). Prevalence of syphilis among the inmates of the Government Hospital for the Insane. *Journ. Amer. Med. Assoc.*, 1915, lxi, 972.

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