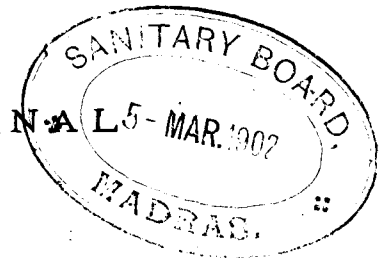


PUBLIC HEALTH:

THE JOURNAL



OF THE

Incorporated Society of Medical Officers
of Health.

EDITED BY

REGINALD DUDFIELD, M.A. CAMB.

Volume XII.

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PREFACE

THE completion of another volume of our official Journal—the twelfth—gives me the opportunity of reviewing, and to some extent appraising, its contents. The Society is to be congratulated on the fact that the contents of this volume surpass in permanent value those of its predecessors. By the able work of the Editor we have been kept in touch with recent advances in the science of public health and with important details as to administration, as well as with the most recent legal decisions bearing on public health matters.

It is, however, no disparagement to the work of the Editor to state that the calibre of the contents of PUBLIC HEALTH depends chiefly upon the quality of the papers contributed to the meetings of the Society and of its Branches. These must always form the greater portion of the Journal of our Society, and I hope therefore that the higher standard which has been attained during the present year will be sustained and surpassed in the future by the combined efforts of the Secretaries of the Branches and of the individual members of our Society.

I venture also to echo the request of the Editor that members of our Society will furnish him more systematically with copies of all special reports which have more than local interest. By this means PUBLIC HEALTH will become even more than it has been during the past year—a storehouse of facts and reflections on the problems of our life-work, and an indispensable *vade mecum* when administrative difficulties arise.

Our thanks are due, and on behalf of the Society I have pleasure in according them, to the Editor for his work. It is for each of us to render that work more completely successful by our co-operation whenever opportunity occurs.

ARTHUR NEWSHOLME,
*President of the Incorporated
Society of Medical Officers of Health.*

BRIGHTON,
September, 1900.

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year on an average to keep it going. In July, 1894, all the powers formerly enjoyed in respect of it by the Governor in Council were transferred to the Board of Health. It was at once reformed—as to inspection of meat for health, as to general management, and as to finance. The result is easily summed up. As to general management, it is now in a state in which (subject to original and serious faults of plan, and the irremediable effects of long neglect on the structure) the criticism of those who have some knowledge of abattoirs need not be feared; while as to finance, its proper revenues during last year, derived from fees charged on the same moderate scale as formerly, not merely furnished a sum of £800, which was spent on repairs and improvements, but in addition contributed no less than £2,500 to the Consolidated Revenue. Secondly, as to increased efficiency of inspection, the matter is in this stage: while the public accuse the Board of laxity and inattention, stockbreeders and butchers approach the Premier with complaints that inspection is carried out with unnecessary and absurd stringency. It will appear directly that these two contradictory accusations are not quite irreconcilable, the apparent conflict really arising in the prudent preference the public have for Government Departments when a whipping-post is to be chosen.

Thus far, then, no law expressly designed to prevent the sale of diseased animals and meat for the food of man has been mentioned, and the case stands thus: one abattoir at which there is efficient inspection; an area around it with a radius of about five miles within which there may not be any private slaughterhouses; and outside that area the rest of the country, over which of course private slaughtering goes on. Though there may not be any private slaughtering within the area, meat privately slaughtered outside it may be brought into it. One fact alone need be mentioned to illustrate the full effect of omission to forbid this. It is perfectly well known to all directly concerned that some butchers (I do not indiscriminately accuse the whole trade), when they acquire animals for slaughter which, though perhaps not certainly diseased, are yet of doubtful aspect, do not send them to Glebe Island to be killed, but to some of the private slaughter-yards just outside the area. It is such meat which competes with the inspected meat sent out from the abattoir, and threatens the reputation of that establishment. The way to protect the abattoir from this danger was obvious, and has been attempted. Clearly, it was to stamp the wholesome abattoir meat, so as to distinguish it from uninspected meat which might or might not be wholesome. But, after a great deal of preliminary organizing, as soon as the attempt was made

the butchers who killed at the abattoir objected. They said they should approve of stamping if only it were general, but as long as some meat was not stamped they felt confident that the presence of abattoir-stamped meat alongside it in the shops would render it unsaleable. That was the practical view taken by an important section of the trade in Sydney of the present state of public feeling on this matter; and, therefore, although disappointed that stamping could not fairly be insisted on at the abattoir, I yet welcomed the objection for the sake of the opinion which gave it weight.

But are the slaughterhouses outside the area uninspected? Not entirely. The Board of Health (to which in point of fact the public owe the initiation of every step which has thus far been taken to restrain the sale of diseased meat) suggested the introduction of the Diseased Animals and Meat Act, which became law in 1892. It applies to the whole country, and its scheme is to authorize persons to take animals and meat which they consider to be diseased to a court of petty sessions. If the magistrate grant an order for destruction, then criminal proceedings can be instituted against the owner for selling or exposing for sale the diseased animal or meat. The Board was appointed to administer this Act, and it forthwith authorized about 800 persons to act under it in every part of the country. These inspectors have done, and are still doing, valuable work. But it was necessary to appoint them from among two classes of the community chiefly, namely, municipal officers and police officers who were already rather over-occupied with other duties, and were not accorded any increase of pay. Another drawback was that, for the most part, these officers could, in the nature of the case, have but a bush-knowledge of cattle diseases as a rule, so that their action was liable to be hampered by disputes. Lastly, a physical difficulty was met with as regards inspection of meat at slaughterhouses; it consisted merely in this: that slaughterhouses round towns are scattered—one may be placed four or five miles east, another four or five miles west; and the end of it is that a single inspector, be he otherwise over-occupied or not, cannot be present at both these places at the usual times of slaughtering. Thus we reach a further stage. The obvious remedy for the last-mentioned difficulty is to concentrate slaughtering at public abattoirs. And accordingly sections were inserted in the Noxious Trades and Cattle Slaughtering Act of 1894—again an Act introduced at the instance of the Board, and designed to give better powers of inspecting slaughterhouse buildings and utensils, etc., and not for the inspection of meat, which was already quite sufficiently provided for under the Diseased Animals and

Meat Act—empowering municipalities separately or in combination to establish central abattoirs, and to forbid private slaughtering within the area which it was judged the central abattoir could serve. These sections were slightly amended by the Public Health Act, 1896, though practically they remained the same. This power, then, was given five years ago, and as yet no such central abattoir has been established. There had been, in fact, a very important omission. There was no provision empowering municipalities to borrow money for this purpose, and, if there had been, many of them had no unhypothecated security to offer for the loan. So that although thirteen municipalities at Newcastle, in a public spirit worthy of praise, have come to an agreement among themselves to erect an abattoir, have chosen a site for it, and have even had rough estimates of the cost made, in three years they have been able to get no further. But, if their public spirit be praiseworthy, it is also necessary to draw attention to their commercial acuteness. They were able to see, not merely that an abattoir would be a public benefit, but that it would also be a perfectly safe and highly profitable speculation; and in this connection I venture to refer again to the profits yielded by Glebe Island under sound management, in order to point out that the slaughtering fees charged there are very small, and in some respects much below those which might and would be charged at a newly-established slaughterhouse.

And now, after the foregoing detail, the end comes in view. You are aware of one abattoir, and in the whole country one only, where meat is regularly inspected for health; you see it standing on a small area within which there is no other slaughterhouse besides itself, but into which you also see uninspected meat being brought. Outside that area, and from its boundary to the furthest verge of the country, there are only private slaughterhouses; they are under a law which is sufficient to prevent diseased meat from going forth from them, and all are within reach of an inspector appointed to execute that law; but you see that from their scattered distribution it is practically impossible for the inspector in any district to exercise his functions systematically and effectually. To avoid this state of practical non-inspection you are now aware that concentration of district slaughtering at central points has been proposed, and even facilitated, by sections introduced in certain statutes; but you know also, first, that in the course of five years one district alone has attempted to take advantage of the powers thus conferred; and, secondly, that even that district has failed of success for want of money of its own and of power to borrow money. You have also

noticed, no doubt, the lack of expert knowledge on the part of a majority of the inspectors authorized to take action under the Diseased Animals and Meat Act. Now, it is possible that some here present may have become aware of these facts for the first time to-day; but it must not be supposed that the Board of Health has neglected them, or that it has failed to propose a remedy. Two years ago it suggested a scheme for securing efficient inspection of the meat consumed at all populous centres, which was described at length in its Annual Report for 1897. I proceed to recapitulate its more important features.

It is impossible to take a step in this matter without money, and a Government may well shrink from any plan which, though likely to be beneficial, might lead to a large expenditure of public moneys without any very good prospect of repayment. For this reason I insist that the scheme to be proposed will and must support itself. The possibility of its doing so rests on this fact—that the amount of slaughtering done at the date of inquiry in any district which may be defined can be ascertained with precision, and nothing can diminish that amount, except decline of the population. The fees which can be charged for slaughtering the various classes of animals having been next fixed, the revenue which the central slaughterhouse will yield can be reckoned at once. But as soon as the revenue is known, only two steps remain to be taken—to capitalize it, and then, to cite a maxim of prudence, to take care to cut your coat according to your cloth. Theoretically, at all events, the smallest village might thus provide its own public abattoir; for if the amount of business to be done were small, the revenue and the capital sum it represented would be small also, the slaughterhouse to be authorized would be planned on a correspondingly small scale. Under such circumstances an abattoir may be regarded as an unimpeachable security, and I confess I am at a loss to conceive why the City Council, after agreeing to take over that profitable and going concern, Glebe Island, and to re-establish it on modern lines in a more suitable situation, after the lapse of a year, should not even have begun the work. We have reason to think that Newcastle, with shrewder business insight, would have carried it through long ago.

Such abattoirs must, of course, be managed by municipal councils, to which power to establish them must be given. But it is not enough to give them an option. The matter is one of general public interest and of public health, and the power should be given subject to a proviso that it must be exercised when an appointed body, speaking after due inquiry, requires them to proceed. This

proviso implies, of course, that the Government is ready to lend the necessary capital on security of the calculated revenue; and therefore there should be, perhaps, a countervailing proviso that no municipality should exercise its power without approval of the body referred to. Although the abattoir be managed by a municipal council, or combination of councils, the inspectors employed therein must be independent of local influences, and must have security of tenure during good conduct. I need not support this assertion to you; to discuss the manner in which such security should be afforded would delay too long, and the question is not free from some practical difficulty. But without it I confidently assert that inspection of meat for health would be in danger of falling into disrepute.

Such an abattoir must, of course, have a monopoly of slaughtering within the area it can serve, and we have seen from the example of Sydney that this cannot be conferred merely by prohibiting private slaughtering within it. No meat but that slaughtered under inspection must be saleable within the area, and to secure this all such meat must be stamped for health. Meat once stamped for health, however, must be saleable in every part of the country; and thus it appears that as soon as two or more such abattoirs have been established, one might break the monopoly of another or others by sending stamped meat into their districts. It would, I think, be neither desirable nor practicable to authorize different forms of stamp for different districts; there should be but one form for the whole country. But after considering the course of trade, I have concluded that this danger is so small as to be negligible. For instance, Sydney abattoir flourishes, though it has no monopoly at all, but, on the contrary, competitors who are not merely numerous, but in some cases dangerous.

In reality, private slaughtering could not be altogether abolished. Nothing has yet been said of the large meat export works, where, I hasten to say, inspection, introduced with a prudent business object, is thorough. Export meat is faithfully inspected, and no diseased or even doubtful carcase is ever passed for export. Whether carcasses which are not good enough for export, and, in short, are diseased, ever find their way to the home-market, there to take their chance of seizure, is another matter. But there is no reason at all why these establishments should not be allowed to use the authorized stamp, provided only that they consented to pay the salary of an experienced inspector, who should, in their case too, have security of tenure; certain police fees now paid for inspection of brands might then be remitted, and in several cases this remission would

more than cover the required salary. I have reason for saying that this arrangement would be welcomed by some proprietors at least, and that a stamp for health, guaranteed by the Government, and known to represent an efficient and independent organization, which would stand the keenest scrutiny of interested visitors and of agents, would in a short time become an asset of great value to the country, and an asset such as no other part of Australia possesses.

Lastly, a class of educated inspectors must be created. I do not apprehend any difficulty about that. Meat inspection requires some special training. Veterinary surgeons so trained would perhaps make the best inspectors, but they are not available in sufficient number; and after all, opinion is divided on the question whether they or experienced and trained butchers make the best inspectors of meat. I feel certain that no better material for making a skilled inspector can be found than an intelligent butcher; and, notwithstanding some obvious considerations to the contrary, I rather favour the butcher. Every large abattoir under the supervision of a veterinary head would form a training school; and power should be reserved in the articles under which they are established to use them for this purpose, and to furnish them with the equipment and small conveniences which would be necessary. In this work of training the Technological Colleges might well be invited to join.

SOLIOD MICROSCOPIC STAINS.—These stains for bacteriological and other microscopic work are prepared by Messrs. Burroughs, Wellcome and Co. in the well-known tabloid form. Full directions are given for making up the various staining solutions in ordinary use, and we have found that the solubility of the dyes is in accordance with the statements made in that respect. We think, however, that the Bismark brown stain is better made up from a saturated alcoholic solution than from the alternative saturated aqueous solution mentioned in the directions. We have tested solutions made up from soliods of Bismark brown, gentian violet, methylene blue, fuchsin, and eosin in the usual routine of laboratory work, which has included the staining of cover-glass specimens of various bacteria, of bacteria in sections of tissues, and of blood containing a malaria parasite. The methylene blue has also been carefully tested as a general tissue-stain. We have found that all the five stains give excellent results, and the anilin dyes used are evidently of the highest quality. These soliods are sure to be extensively used, as it is a great convenience for workers in private laboratories to be able, without the trouble of weighing, to make up small quantities of such stains as Gram's anilin gentian violet solution, or the carbol fuchsin stain for tubercle, which decompose if kept for more than a very short time. The portability and general convenience of these soliods will also insure their use by medical officers in the services. As future additions to the list, we might perhaps suggest soliods for making up Gram's iodine solution, and Jenner's very useful eosin and methylene double stain for blood.

NEW LEGISLATION.

SESSION 1899.

II.*

Sale of Food and Drugs Act.—Before proceeding to consider the sections of this Act *seriatim*, we desire to note that the definition of food contained in Section 2 of the Act of 1875 is repealed, and the following substituted therefor :

“The expression ‘food’ shall include every article used for food or drink by man, other than drugs or water, and any article which ordinarily enters into or is used in the composition or preparation of human food; and shall also include flavouring matters and condiments.”

The introduction of “ordinarily” in the matter of composition of food is to be regretted, and was objected to by many authorities when the Bill was before Parliament. The exact interpretation of the term will require to be settled by a ruling of the Higher Courts. We would also note that for the purposes of the various brandings and labels required by the Act, “separated” milk is to be termed “machine-skimmed” milk. The new description of separated milk is unfortunate, as it is more than questionable whether the true meaning of the term will be comprehended by those purchasers for whose benefit it was desired to secure the proper marking of separated milk. We think that infants of the poorer classes will continue to be fed on “starvation” brands of separated milk, although sold as “machine-skimmed.”

Much of the Act as originally drafted was intended for the protection of the agricultural interests of the country, and although the intentions of its framers were to a certain extent departed from and modified during the progress of the measure through Parliament, yet those intentions account for certain provisions which would otherwise appear out of place in an Act such as this. These peculiarities will be manifested in the following short notes on the sections of the Act.

Section 1.—Originally limited to agricultural products, such as milk, butter, and cheese, this section now makes it an offence to import into this country (d) “any adulterated or impoverished article of food to which her Majesty may by Order in Council direct that this section shall be applied, unless the same be imported in

* No. 1 was published in our last issue.

packages or receptacles conspicuously marked with a name or description indicating that the article has been so treated.” The Commissioners of Customs will take the necessary samples for carrying out this Section, and will communicate their results, together with the name and address of the importer and particulars of the article in question, to the Board of Agriculture. There is no provision for further communication of the information.

Section 2.—In “the general interests of the consumer” the Local Government Board, and “in the general interests of agriculture” the Board of Agriculture, may direct their officers to take samples of “any article of food” and submit the same to the local public analyst. The samples are to be divided into four parts, three of which are to be disposed of in the usual way, and the fourth to be sent to the Board, which will forward the results of analysis to the local authority. The duty of taking proceedings when requisite will rest with the local authority.* Although the machinery introduced is somewhat cumbersome, we think that an active system of Government sampling to supplement the work of the local officials will be beneficial. We need hardly remark that the latter are only too well known, and that the percentage of adulterated samples purchased by private individuals is many times larger than that of samples purchased by the local officers.

Section 3.—The appointment of public analysts and the enforcement of the Acts are made compulsory by this section. Should any authority make default in these matters and continue in default after communication from the Local Government Board or the Board of Agriculture, either Board may appoint one of its officers to put the Acts into force and recover the expenses from the defaulting authority. This provision should put an end to the farce which has been going on for so long, viz., communications to defaulting authorities from a Local Government Board without power to take further steps. We do not see the need of giving the Board of Agriculture the power of action in these cases, the Local Government Board being the proper authority. By sub-section (5) of this section, public analysts on appointment will be required to furnish the Local Government Board with “such proof of competency as may from time to time be required” by that Board. This suggests that in the near future public analysts will be required to possess certain prescribed qualifications.

Section 4.—Under this section the Board of Agriculture has the power to fix the limits of deficiency from the normal in the compo-

* We are in doubts as to effect of time limit (see Section 19) on the possibility of instituting proceedings in these cases.

sition of milk, cream, butter, and cheese, and declare what addition of extraneous matter thereto, or proportion of water therein (including, as to the former, condensed milk), shall raise a presumption that the article in question is not genuine, or is injurious to health. A preliminary inquiry is provided for, which, we presume, is the inquiry now being held by direction of the Local Government Board.

Section 5 extends the Margarine Act of 1887 to margarine cheese, and *Section 6* prescribes that the marking required under these Acts shall be branded on the case containing the margarine, or margarine cheese, and not be only on an attached label; and, further, that the lettering on the paper wrapper used in the sale of margarine shall be in type not less than one-half inch in length, and that there shall be no other printed matter on the wrapper in question. *Section 7* requires manufacturers of all forms of margarine products to keep certain registers, the same to be properly posted up and open to the inspection of the officers of the Board of Agriculture. One of the registers is to show to whom and in what amounts the margarine products are consigned. Wholesale vendors of margarine are to be registered as manufacturers are at present. By *Section 8* the maximum amount of butter-fat permissible in margarine is fixed at 10 per cent. It is generally recognised that the maximum amount which margarine will contain, except by subsequent admixture, is 6 per cent., so that there is a sufficient margin allowed.

Section 9.—When milk or cream is sold in any highway or place of public resort, the vehicle or receptacle from which such milk or cream is sold, is to be conspicuously inscribed with the name and address of the vendor, who will be liable to a fine not exceeding £2 for not complying with this provision. Every receptacle containing condensed, separated, or skimmed milk, is to be labelled as such, with "large and legible type," under a penalty not exceeding £10 (*Section 11*). The "mixture label" required under *Section 8* of the Act of 1875 is not to be deemed sufficient unless "the notice of mixture given by the label is not obscured by other matter on the label." Trade-marks already registered, and labels which have been in use for at least seven years prior to the commencement of the Act (January, 1900), are to be exempt from this provision, but no new trade-marks will be registered which do not comply with the *Section* (*Section 12*).

The present routine of work under the Acts will be modified in future in the following particulars: On completion of the purchase the division of the sample which under *Section 14* of the Act of 1875 is to be offered to the vendor is to be obligatory in

every case, and one part is to be delivered to the vendor, should the officer be required to do so. (*Section 13*.) Samples of all kinds of foods may be taken in the course of transit at the request of the consignee or purchaser (*Section 14*), and in the case of milk, margarine, and margarine cheese, such samples will have to be divided (presumably into three parts), and one portion thereof sent to the consignor, "if his name and address appear on the can or package" from which the sample is taken (*Section 10*). It is curious that this provision does not appear to apply to any samples taken under *Section 14* of this Act. Samples may be forwarded to the public analyst or other person by registered parcel, in lieu of letter-post. (*Section 15*.) For obstructing or impeding an officer, or for offering him a bribe or other inducement so as to prevent the execution of these Acts, a penalty not exceeding £20 for a first, £50 for a second, and £100 for any subsequent offence is provided (*Section 16*). When an article is exposed for sale in an unopened tin properly labelled, the vendor cannot be required to sell such article otherwise than in the unopened package (*Section 18*).

Proceedings for offences under the various Acts will have to be taken in all cases within *twenty-eight* days from the date of purchase; the summons is to state the nature of the offence with which the defendant is charged, and to be accompanied by a copy of the analyst's certificate, and is not to be returnable for hearing until after the expiration of *fourteen* days from the date of service. (*Section 19*.) As the analyst will require, under ordinary circumstances, from three to seven days for his analysis, and the solicitor or prosecuting officer another period of about the same duration for completing his case, there will be but little margin left over from the fourteen days or less available before taking out the summons. It is probable that it will be necessary for local authorities to give one or other of their chief officers general powers to proceed under the Acts and report that action to the authority at a subsequent date. Very little good will result from making a regular practice of taking samples on a fixed day previous to the meeting of the authority to allow of all cases being referred thereto for instructions to prosecute. It may be added here that, in the Metropolis at least, some three or more days may, and frequently do, intervene between the issue of a summons and its service. If the defendant intends to rely on a warranty given by the vendor of the goods, he must give notice of such intention to the prosecutor not later than seven days after service of the summons, stating the name and address of the giver of the warranty and forwarding copy of the same, and must also communicate his intention to the giver of the warranty.

The giver of a warranty is to be entitled to appear and give evidence on his own behalf, but no warranty from a person resident outside the United Kingdom will be accepted as a defence. A servant who is a defendant in any proceedings will be entitled to plead a warranty, provided he proves that he had no reason to believe that the article sold was otherwise than as described in the warranty. If a defendant maintains his plea of warranty, and the case against him be dismissed, proceedings against the giver of the warranty may be taken in the district where the sample is purchased, or in that where the warranty was given. (6) "Every person who, in respect of an article of food or drug sold by him as principal or agent, gives to the purchaser a false warranty in writing, shall be liable . . . for the first offence to a fine not exceeding £20 . . . unless he proves to the satisfaction of the court that when he gave the warranty he had reason to believe that the statements or descriptions contained therein were true." (Section 20.) The discretionary power to refer samples to Somerset House on the request of prosecutor or defendant formerly vested in the court hearing the case will be taken away, and the court will be obliged to send such samples if asked so to do, and may, further, send the sample of its own initiative if thought desirable. (Section 21.) A defendant may put in a certificate of analysis of the portion of the sample handed to him, made by any public analyst, provided that the certificate be in the form prescribed by the Act of 1875, and that a copy of such certificate shall have been sent to the prosecutor at least three clear days before the hearing of the case. The prosecutor may require the analyst giving such certificate to attend for cross-examination, and if the copy of the certificate has not been forwarded to the former as required under this section, the court may adjourn the case "on such terms as may seem proper." (Section 22.) Where the Act of 1875 provides a penalty not exceeding £20 as a maximum for any offence, this Act will provide one not exceeding £50 for a second offence, and of £100 for any subsequent offence; and, further, where a person guilty of an offence under any of the Acts is liable to a fine not exceeding £50, and the court is satisfied that the offence was committed "by the personal act, default, or culpable negligence of the person accused," he will be liable to imprisonment, with or without hard labour, for a term not exceeding three months, "if the court is of opinion that a fine will not meet the circumstances of the case" (Section 17).

The Act, subject to the appropriate modifications, will apply to Scotland and Ireland.

THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

REPORT OF COUNCIL, SESSION 1898-99.

1. The Council is able to congratulate the members on the progress the Society has made during the last year: 88 fellows, 10 members, and 5 associates have been elected; 19 fellows have resigned, and 4 have died; 4 members and 4 associates have resigned. There are now on the roll of the Society 750 fellows, 56 ordinary members, and 77 associates. There are in addition 29 honorary fellows; the Society has lost by death Lords Herschell and Playfair and Sir Douglas Galton.

2. The customary number of meetings of the Society have been held during the Session, and your Council are pleased to be able to report that they have been well attended, and considerable interest has been taken in the subjects brought up for discussion.

At the Annual Meeting in October Dr. Gwynn devoted his Presidential Address to point out the Duty of the Medical Officer of Health as a Public Teacher. In November Dr. W. H. Symons laid before the Society the result of an inquiry into the Relation of Cancer to the Dwelling. Dr. A. Newsholme opened a discussion at the January meeting on the Prevention of Phthisis, with special reference to the question of notification. In February Dr. F. J. Allan read a paper on Diphtheria, dealing with the duration of infection after an attack, and on the use of Antitoxin as a Prophylactic. Dr. Alfred Ashby contributed a paper on the Duties of Medical Officers in relation to Small-pox in View of the Altered State of the Law relating to Vaccination, in March; and in April Dr. Alfred Hill introduced the subject of Antiseptics in Food, which led to an important discussion.

The Provincial Meeting of the Society was held at Stratford-on-Avon, when an interesting and appropriate address was delivered by the President, Dr. Gwynn, on Shakespeare and Sanitation.

The Branches of the Society have also held meetings in their own districts, when matters referred to them by the Council have been considered, as well as many valuable original papers. These have been reported fully in PUBLIC HEALTH.

3. Your Council held five ordinary meetings during the year, and in addition there have been a considerable number of meetings of committees. Among the subjects which received their attention may be mentioned the question of Superannuation, the Amendment of the Infectious Diseases Notification Act, the Census of 1901, the Classification of Deaths from Diarrhoea, the Necessity for a more Definite Certificate of Vaccination, the Payment of Expenses of Members attending the

Council Meetings, and many Bills before Parliament, where their progress has been carefully watched by the Parliamentary Committee, and action taken where considered advisable. Conferences have been attended by delegates from the Council in regard to Superannuation, Registration of Plumbers, Sanitary Inspectors' Examination Board, the London Government Bill, etc.

4. It is with regret that the Council have to report the resignation of Dr. H. Manley as one of the Hon. Secretaries; Dr. Mitchell Wilson has been appointed in his stead.

HERBERT MANLEY,
FRANCIS J. ALLAN,
Hon. Secretaries.

August 30th, 1899.

REPORT OF THE EDITOR.

TO THE PRESIDENT AND COUNCIL OF THE INCORPORATED
SOCIETY OF MEDICAL OFFICERS OF HEALTH.

GENTLEMEN,—

The year which has elapsed since I presented my last report has been so uneventful that I find it difficult to frame a further report of any value. The first volume in the new form, the eleventh of the Journal, is in your hands, and criticism thereof rests with you. I desire here to place on record my sincere thanks to Dr. Allan, our Hon. Secretary, for kindly undertaking my work during the two months that I was in the grip of that untamed foe influenza.

With regard to the future, I would again express my desire for material for publication as independent supplements, for which original work, either in the laboratory, the office, or the field, is most suitable. Under existing arrangements, I feel that sufficient use is not made of the annual reports issued by medical officers of health throughout the country. Barren reviews of such documents I have always held to be unsuited to the aims of the Journal. Comparison and compilation appear to promise more instruction, but up to the present time it has not been possible to undertake such work. From the examinations made from year to year, it appears desirable that an attempt should be made to secure the *universal* use of a table such as that known as "Table III." of the Society, in all reports. It would then be possible to make strict comparison between one district and another, and to group reports of counties, etc. A "Sanitary Gazetteer," containing information as to the geological formation of each district, outlines of the conditions of life, sewerage, water-supply, and other matters

affecting health, would be found exceedingly useful. With the co-operation of the members of the Society, there should be no real difficulty in compiling such work of reference.

Some two or three years ago the subject of federation was mooted, whereby societies having kindred and, in many cases, overlapping interests might be brought into efficient co-ordination. It has occurred to me that it would be to the best interests of our Science were it possible to arrange for one publication to represent several such societies, rather than that each should have its own independent organ. Economy as to expenditure, and increased power of influencing public opinion, might reasonably be expected to follow such amalgamation.

I have the honour to be, Gentlemen,

Your obedient servant,

REGINALD DUDFIELD,

Editor.

19, Blomfield Road,
Maida Vale, W.,
August 30th, 1899.

REPORT OF THE HONORARY TREASURER.

TO THE COUNCIL OF THE INCORPORATED SOCIETY OF MEDICAL
OFFICERS OF HEALTH.

GENTLEMEN,—I beg to submit annual statement of receipts and expenditure, together with balance-sheet for the year 1898-99.

For the first time for many years the expenditure of the Society has exceeded the income, the balance carried forward this year being £779 9s., against £831 13s. 6d. last year. This is, to some extent, accounted for by the increased cost in the printing and publication of the Journal, and the absence of any *chèque* on account of the amounts received by the Publisher.

I am, Gentlemen, your obedient servant,

(Signed) W. H. KEMPSTER,

Hon. Treasurer.

Chesterfield,
North Side,
Clapham Common, S.W.
August 15th, 1899.

THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

Income Account: August 11th, 1898, to August 5th, 1899.

EXPENDITURE.		INCOME.	
To Printing:		By Balance from last Account	£831 13 6
Messrs. Rebman, Limited	£42 17 10	Subscriptions	£627 9 0
" Lowe Bros.	5 9 3	Interest on Amount on Deposit at	
" Golding and Plummer	1 4 6	Union Bank	3 3 1
Stationery:	£49 11 7	One year's dividend on £4,099	
Mr. J. Collard	5 9 3	17s. 5d. India 3 per cent. Con-	
Messrs. Eyre and Spottiswoode	1 13 10	solidated Stock (Berridge Be-	118 18 0
" Goodinge and Son	1 6 6	quest)	
" Shaw and Son	0 9 11	Half-year's dividend on £514 16s.	
Mr. C. A. Mason	0 9 0	Metropolitan 2½ per cent. Stock	6 4 6
Annual Meeting and Dinner (ex-			755 14 7
penses of)	47 15 1		
Less received for Tickets	26 12 6		
Journal Printing and Publishing	21 2 7		
Account:			
Messrs. W. H. and L. Colling-			
ridge	63 3 5		
Messrs. Rebman, Limited	246 9 5		
Journal Editorial Account:	309 12 10		
Editorial Expenses and Pay-			
ment of Contributors	107 6 6		
Petty Cash, Postage, etc.	9 19 6		
Parliamentary Publications	1 1 5		
Carried forward	118 7 5	Carried forward	£1,587 8 1
	£508 2 11		

(Public Health

October, 1899]

Accounts 1898-99

EXPENDITURE.		INCOME.	
Brought forward	£508 2 11	Brought forward	£1,587 8 1
To Clerk's Salary	38 15 0		
Mr. T. P. Scrivener (Auditor's Fee)	5 5 0		
" Hussey, Professional Assist-			
ance re Alteration in Journal ...	5 5 0		
Office Expenses:			
Postage, Telegrams, etc.	£22 0 0		
Travelling Expenses	0 1 2		
Stationery	1 16 6		
Cupboard, purchase of...	0 18 6		
Parliamentary Papers	0 6 10		
Provincial Meeting, 1898, Ex-			
penses of	2 10 0		
Ordinary, Council and Com-			
mittee Meetings, Expenses of	1 16 1		
Attendants at 197, High Holborn	1 12 0		
Typewriting and envelope ad-			
dressing	1 7 6		
Miscellaneous	0 9 5		
Less in hand as per Petty Cash	32 18 11		
	1 9 5		
Donation to Fund for promoting	31 8 7		
Superannuation Bill	10 0 0		
Dr. F. J. Allan (Hon. Secretary's			
Petty Cash)	2 4 0		
Mr. W. P. Dickinson (Lithography)	2 15 0		
Commission, etc., on Purchase of			
Stock	1 6 0		
Bank Commission, etc.	0 11 2		
Branches (Proportion of Subscrip-			
tions):			
Metropolitan	30 7 6		
Carried forward	£605 12 8	Carried forward	£1,587 8 1

EXPENDITURE.				INCOME.			
	£30	7	6	£605	12	8	
Brought forward	...	...	...	...	...	...	...
Midland ...	24	15	0				£1,587 8 1
Northern ...	19	7	6				
North-Western ...	25	17	6				
Yorkshire ...	33	15	0				
West of England and South Wales ...	14	10	0				
Home Counties ...	18	7	6				
Southern ...	12	15	0				
Scottish ...	18	0	0				
Total expenditure				197	15	0	
Balance 5th August, 1899				803	7	8	
				784	0	5	
				£1,587	8	1	£1,587 8 1

Balance-sheet: August 5th, 1899.

LIABILITIES.		ASSETS.		Public Health	
				£	s. d.
To Capital Account:		By value of £4,099 17s. 5d. India Stock at cost, standing in the names of Messrs. Lovett, Murphy and Seaton ...	4,000	0	0
Mr. Berridge's Bequest	...	Value of £514 16s. 2½ per cent. Metropolitan Stock, per cost standing in the names of Messrs. Gwynn, Kempster and Allan ...	500	0	0
Balance of Income over Expenditure to date	...	Cash, at Bank ...	279	19	0
		Petty cash in hand ...	4	1	5
			£4,784	0	5

THE SANITARY INSTITUTE CONGRESS, AUGUST, 1899.

THE Congress convened by the Sanitary Institute at Southampton was well attended, and a number of excellent discussions took place in the various sections and conferences into which the Congress was divided.

Among the many papers submitted to the meetings, most interest appeared to be taken in the subject of plague and the precautions to be taken by European countries; the ventilation of sewers; the work of port sanitary authorities; and the various problems connected with tuberculosis. Good as the discussions were, they might have been rendered more valuable had those who took part in them had the opportunity of knowing some time before the meeting what matters were likely to be dealt with in the papers. Under the arrangement which has hitherto obtained at these gatherings, not even the titles of the papers to be read are known until the opening day of the Congress.

PRESIDENTIAL ADDRESSES.

There were eleven subdivisions of the Congress, and in each an opening address was given by the respective president. There was also an address by Sir W. H. Preece, K.C.B., the President of the Congress, and lectures by Mr. Malcolm Morris and Bailie James Dick of Glasgow.

Sir WILLIAM PREECE dealt with sanitary engineering in its varied applications. He claimed that Moses was the greatest sanitary engineer the world had ever known, and that the discoveries of science had shown that Moses' doctrines were based upon sound principles. He expressed the opinion that legislation as affecting many phases of local government was probably ample. It was the enforcement of regulations, the control of supervising powers, that was weak, especially in regard to small districts. The big towns could and did take care of themselves, but "the little towns are too often the arena of personal squabbles, party spirit, ignorance and self-interest," which render abortive the efforts of their advisers. He agreed with Tennyson that "If God made the country and man the town, the devil made the little country town."

Sir JOSEPH EWART, M.D., and Dr. T. ORME DUDFIELD, who presided over the Sanitary Science and Preventive Medicine Section and the Conference of Medical Officers of Health respectively, traced the effect of legislation upon the health of the people, the latter dealing especially with the results obtained through notification of infectious disease, and the advantages of hospital treatment. Sir Joseph quoted voluminous statistics demonstrating the improvement in the public health which had taken place during the Queen's reign, and observed that the navy and army had participated therein. A substantial reduction in the mortality among our soldiers at home had taken place, but in the navy the results were even better. Thus, in the years 1858, 1859, and 1860, the mortality from disease was 25·8, 16·17, and 14·7 respectively, but in the quinquennial period of 1891-95 was only 7·10, and in 1896 and 1897 the rate averaged 5·2. He referred also to the marked improvement which had taken place in the health of our soldiers in India, largely through the influence of Lord Roberts.

Professor PERCY FRANKLAND, who presided over the Section of Physics, Chemistry and Biology, in his address complained that so little had been done to promote science in this country. He was afraid we were losing our reputation as pioneers in sanitary science. The promotion of science, in his opinion, was of as vital importance as the provision of ironclads. After pointing out the valuable work done by Parliamentary and Special Committees, he referred to recent reports dealing with the three questions of (1) the admixture of water-gas with coal-gas, (2) the use of lead in the manufacture of pottery, and (3) the evils resulting from the employment of phosphorus in the making of matches, all matters which had led to a conflict between commerce and sanitation.

THE PLAGUE.

The "Recrudescence of Plague in the East" was the subject of a paper by Professor W. J. SIMPSON, M.D. To the precautions advised by the Venice Conference to prevent importation of the disease, he was of opinion that two others should be added, viz., the use of the protective power of Haffkine's prophylactic (not to be confused with the serum, which is used for treatment), and measures for dealing with rats at infected ports, and on ships from infected ports, either on the voyage or on arrival at a healthy port. He stated that Haffkine's prophylactic would keep for at least three or four months, and that large supplies should be provided in order that the authorities may be prepared for every possible contingency. Hitherto plague had not attacked Europeans in India to any great extent, and it was therefore of the highest importance that an inquiry should be instituted as to the form in which the disease was now present in Portugal, and as to its mode of spreading. Professor Simpson held that it was a matter of international importance that all countries should unite in opposing the progress of the disease. Every endeavour must be made to improve the general sanitation of places liable to be invaded, and special attention should be paid to conditions of overcrowding, poverty, and filth. Dryness and purity of soil were more important in regard to plague than excellence of water-supplies.

Dr. MASON (of Hull) drew attention to the danger likely to arise from vessels of the "tramp" class, which carried no surgeon. He had drawn up a circular giving advice to masters of vessels on the subject, and with the co-operation of the owners he had arranged for a rat-catcher to visit every ship on its arrival, and the rats caught were at once cremated. In reply to questions, Professor Simpson said that on shore the rats should be caught and their runs saturated with disinfectant. Notification of cases, or of suspected cases, must be prompt. The following resolution was adopted:

"That a representation be made to Government that it is at the present time of great importance to the health and trade of the empire that a Commission consisting of experienced physicians, epidemiologists and bacteriologists be appointed to visit the Peninsula and study on the spot the peculiarities of the present outbreak of plague in its epidemiological, prophylactic, and curative aspects as modified by its conditions in Europe, and that immediate steps should be taken by the Government to provide such a supply of Haffkine's prophylactic and the other curative serum as will meet the urgent wants of our seaports."

VENTILATION OF SEWERS.

Considerable discussion was evoked by a paper on this subject by Dr. D. S. DAVIES (of Bristol), who claimed for Bristol and Clifton a

superiority over towns in which sewers were ventilated, in respect of general health, and especially of freedom from fever, diphtheria, and diarrhoea.

Dr. NEWSHOLME did not quite agree with Dr. Davies' deductions from the statistics given, and thought that sufficient importance had not been attached to other factors. However, it was generally agreed that the absence of the ordinary means of sewer ventilation in Bristol had led to no deterioration of health, and the surveyors and engineers present were many of them convinced that the ordinary methods adopted might be changed. In fact, it was said by one speaker that if medical officers of health would only support the engineers, they would be only too pleased to shut up the street grids, and thus get rid of a constant source of complaint.

[It is not quite correct to say that Bristol has no ventilation for its sewers, as means are provided for the relief of pressure of air in the sewers, through soil-pipe ventilating shafts and street gulleys. It was felt that it would be better to have certain shafts through which the excess of air in the sewers might escape than to allow it to find its own means of exit, which were not under control, because were there any defects in a house drain, it is quite possible that the sewer-air might find its way into the house. Mr. Moss Flower stated that he had found such a condition in a house in which a case of "blood-poisoning" had occurred.]

Mr. MAWBEY (Borough Engineer of Leicester) said that five years' experience had led him to conclude that street grids could be dispensed with. Air probably entered through manhole covers, and through water-closets and waste-pipes. Outlet shafts were put up where required, and care was taken that they were carried above the ridge of the roof.

Mr. R. R. A. MACBRAIN (of Lincoln) stated that he closed street gratings whenever there was a complaint. About 200 shafts (4 inch and 6 inch) had been put up in Lincoln. He believed it was necessary to provide a rust chamber at the foot of each ventilator, as they were liable to be blocked. He did not insist upon the insertion of interceptor traps between the drain and the sewer. Ninety-five per cent. of the houses in Lincoln were without such traps, but each house-drain was ventilated.

TUBERCULOSIS.

In several sections papers were read dealing with the question of tuberculosis. The chief interest undoubtedly centred round a proposition by Dr. NEWSHOLME:

"That this Conference of Medical Officers of Health is strongly of opinion that phthisis—which causes more deaths in England than any other disease (one-fourth of the total deaths at ages 15 to 55 being due to this cause)—is preventible by measures which are completely within the range of personal and public hygiene. That, of such measures, the disinfection or destruction of the sputa of phthisical patients, and the abatement of insanitary conditions of dwelling-houses and work-places, especially those associated with overcrowding, hold the first place. That for the carrying out of such measures notifications of cases of phthisis to the medical officer of health are indispensable, to secure economy of effort and the maximum benefit. That this conference recommends the notification of phthisis for adoption in all sanitary districts, the question as to whether it be voluntary or compulsory being left to the discretion of local sanitary authorities, and that the Local Government Board be urged by the Council of the Sanitary Institute to take the necessary steps to legalize such notification."

The discussion turned almost solely on the question of notification. Dr. Newsholme strongly urged the need for notification, and was sup-

ported by Dr. Niven. The difficulty experienced throughout the country in dealing with overcrowding was used as an argument in favour of notification. Dr. Newsholme considered that overcrowding is the central problem in public health. It was one which surpassed our present ability to completely solve. Palliative measures against it were being gradually adopted, and cheap trains and trams for those who could, and block-dwellings of an improved type for those who could not afford to migrate to the suburbs would doubtless help in time to relieve the stress, though they did not entirely meet the requirements of the case. In the meantime for many years to come a large amount of overcrowding must continue in our crowded centres of population. Was it not better that in connection with this state of matters we should have official knowledge of cases of phthisis, than that we should be blindly attempting to abate such casual cases of overcrowding as were detected by sanitary inspectors? Knowing the cases of phthisis, we could take intelligent precautions against its spread in overcrowded houses; while ignorant of them, we were spending and exhausting our energies on overcrowded houses of much less importance, from the standpoint of the prevention of the spread of disease.

Dr. ARTHUR RANSOME considered that it was probable that houses in which cases recurred contained something favourable to the existence of the tubercle bacillus, and that this sufficed both to nourish it and facilitate its growth. The condensed organic vapours commonly found in such houses formed admirable cultivating media, and in it the bacillus could live outside the body for long periods. The practical lessons to be learned were (1) that local authorities must seek out all the phthisis nests in their districts, and either purify them effectually or destroy them; (2) they must wage war against overcrowding and imperfect ventilation of dwellings, workshops, and places of public assembly; and (3) that they must carefully carry out subsoil drainage, and must insist on concrete basements and damp courses in all buildings.

Sir JOSEPH EWART held that the Local Government Board should at least allow the same local option in respect of the notification of phthisis as of diseases already added to the schedule of notifiable diseases. Opposition was rather directed against compulsory notification, and the meeting evidently did not consider the time ripe for this advance, so the matter was conveniently shelved by moving the "previous question."

The treatment of consumptives by sanatoria and isolation was discussed by Drs. Scurfield, Walters, and Heron.

Dr. SCURFIELD stated that a small sanatorium would achieve for a big town in the course of a few years a very appreciable reduction in the prevalence of consumption—a not very easily communicated disease. In Germany the provision of sanatoria for poor people had been made easier by the law compelling persons with small incomes to insure against sickness. In England it seemed likely that Boards of Guardians would, in the course of time, combine to establish sanatoria for paupers who were suitable cases for the treatment, but the establishment and maintenance of sanatoria for people of limited means, who were not paupers, would be left to philanthropic efforts and voluntary subscriptions, including workmen's subscriptions.

Resolutions were passed expressing the opinion that the early recognition and the prevention of tuberculosis, as well as of certain other diseases, would be expedited and made surer were a rudimentary know-

ledge of the laws that govern the spread of infectious diseases properly taught in all schools throughout the country, and requesting the Council of the Sanitary Institute to draw the attention of the President of the Council of Education to the good likely to follow the practical adoption in rate-aided schools of the above proposal.

In the Conference of Veterinary Inspectors discussions took place in respect of tuberculosis in the cow. It was urged with some emphasis that legislative action was required to prevent the spread of tuberculosis, though there was some little diversity of opinion as to how far the milk of the cow was affected by tuberculosis, and one speaker expressed the opinion that unless it extended to the udder, or tuberculosis existed to any great extent, the milk of the cow was good. The comments on the tuberculin tests were very numerous, and the importance of uniformity of action was generally admitted. Equally interesting was the discussion on cowsheds, in which not only cubic space but good ventilation was required, and here again the necessity of a compulsory measure was dwelt upon, more particularly as affecting the rural districts. Two resolutions were passed at the close of the meeting, one urging the Government to take steps by which the Cowsheds, Dairies, and Milkshops Order should be made compulsory upon local authorities, and the second asking the Government to undertake a scheme for the reduction of bovine tuberculosis.

Dr. BUSHELL ANNINGSON, in a paper on "Guarantees of the Purity of Milk-supply," held that no milk from cows reacting to tuberculin should be retailed to the public until it had been sterilized, and the cream should be heated to 85° F. before being used for churning into butter. The use of milk from animals with diseased udders should be prohibited, and phthisical persons should be excluded from all kinds of dairy employment.

SCHOOL CLOSURE AND INFECTIOUS DISEASE.

One speaker referred to the opinion that school closure, especially in towns, had little effect in preventing the spread of infectious disease, as the children in playing about the streets were as much exposed to infection as if they had been in school. But this opinion was shown by others to be contrary to fact.

Dr. NIVEN had made careful inquiry on the influence school-closure had on measles, and it was perfectly manifest that in the great majority of instances the incidence of measles was affected thereby. Excluding instances in which the majority of susceptible children in a school had been attacked before closure was demanded, he was satisfied that the closing of the infant department is of the greatest value. As to the incidence of the disease on the district, it was likely that the children would probably play more with one another than with those attending other schools, but as the closure had been found to affect those favourably, he believed that *a fortiori* the incidence on the district was also favourably affected.

Dr. ARMSTRONG was of opinion that action in closing schools, to be of the greatest benefit, should be taken before a dozen cases occurred. He thought that sanitary authorities ought to deal with schools much more firmly than had been done in the past.

Drs. Groves, Willoughby (Eastbourne), Bond (Gloucester), Vacher, and others, spoke in support of the suggestion, and it was submitted that children were less likely to catch infection in the open streets than in the schoolroom. Dr. Groves contended that the condition of

many schools was due to the lack of courage on the part of the Education Department to demand more air-space per child.

BACTERIOLOGY AND PUBLIC HEALTH.

Dr. CHALMERS (Glasgow), in introducing a discussion on this subject, said that in the recognition of disease, bacteriology took rank as an additional clinical aid to diagnosis, and should not be looked upon as a test by which other evidences were to be accepted or rejected. In other words, we must adjust its value on the basis of clinical inference. In regard to return cases of scarlet fever, Dr. Chalmers had hopes that such cases might cease when the bacteriology of the post-nasal cavities, and probably also of the eczematous sequelæ affecting the anterior nares and ears, is more fully known. He considered that good work might be done in the bacteriological examination of household dust, and of food exposed to it. Dr. HOPE, in investigating an anthrax outbreak, had traced back in dust the specific organism from tanneries to storeyards, and thence to ships. He thought there was a large field in municipal work for the bacteriologist, and instanced inquiries which might be made in regard to poisonous food, the use of preservatives, the bacterial examination of water. He mentioned that in cases of autumn diarrhoea a bacillus had been found in the feeding-bottles of the infants, similar to that in the vomit and evacuation of the sick child.

Diarrhoeal mortality was less in Glasgow than in English towns, and Dr. Chalmers was inclined to ascribe this to the system of cleansing.

FOOD PRESERVATIVES.

Dr. RIDEAL referred to the experiments conducted by Dr. Foulerton and himself, and reported in *PUBLIC HEALTH* (Vol. x., p. 554, May, 1899). They found that boric acid 1:2,000 (4 grains to the pint), or formic aldehyde 1:50,000, was sufficient to keep milk sweet for twenty-four hours even in warm weather, while the use of the preservative in these quantities appeared to have no appreciable effect upon digestion. Hehner had stated that the experiments showed that digestion was retarded, but Rideal contended that such retardation was so small that it might be disregarded. He had made some supplemental experiments with the same drugs in the same strengths, and he found that the digestion of starch was more interfered with than the digestion of milk.

Breadcrumb, 5 c.c., with 50 c.c. Water exposed to Action of Ferment for Half an Hour.

	ZYMINE.	SALIVA.
	Maltose produced.	
1. Nothing added	0.5395 = 100	0.707 = 100
2. Formic aldehyde, 1 in 50,000	0.477 = 88.5	0.672 = 95
3. Boric acid, 1 in 2,000	0.423 = 78.5	0.607 = 86
4. Malt vinegar, 2½ c.c.	0.258 = 48	0.1647 = 23
5. Salt, 0.2 gramme	0.52 = 97	0.70 = 99
6. Worcester Sauce, 1 c.c.	0.5 = 93	0.57 = 82
7. Alcohol, 5 per cent. (claret and water, 25 c.c. of each)	0.47 = 88	0.767 = 99
8. Tea, ½ gramme infused in 50 c.c. of water	— 91	— 92

Food, of course, would remain in the stomach, and be subject to the action of the ferments for a longer period than half an hour. Cases were on record showing that rash, nausea, and headache might be pro-

duced when as much as a gramme of boric acid was taken daily by an adult.

Professor BOSTOCK HILL considered these experiments as an argument for the non-use of preservatives. Their use even in small quantities was shown to cause greater demands to be made upon the digestion of the individual. It was especially important that milk should be free from preservatives, as the profession were endeavouring to persuade the public to give milk to their babies instead of starchy compounds. He thought the proportion of vinegar used in the experiment was too high.

Dr. HANDFORD said that last year sickness and diarrhoea occurred in the children's ward of Nottingham Hospital, and on analysis it was found that the milk supplied contained 40 grains of boric acid in a gallon. Babies having 2 pints of milk a day were therefore receiving a dose of 10 grains. The diarrhoea ceased so soon as the boric acid was discontinued. A clause was now inserted in their contract with the dairyman that no preservative or foreign substance should be added to the milk. Dr. RIDEAL wished it to be clearly understood that he did not advocate the use of preservatives, and he objected to infants and invalids having food to which chemicals had been added. The feeling of the meeting was strongly in the direction of forbidding their use entirely.

UNHEALTHY AREAS AND MUNICIPAL REHOUSING.

Mr. THOMAS BLASHILL, lately Architect to the London County Council, stated that he had had a considerable experience of the Housing of the Working Classes Act, 1890, and had come to the conclusion that schemes under Part I. were costly to carry out, dilatory in operation, and unsatisfactory in dealing with the rehousing of persons displaced—conclusions which were readily agreed to by the Municipal Section. What was required was an Act which would get rid of the slums, leave the owners the true value of their interest, and actually rehouse the whole of the people displaced, without throwing an unreasonable burden upon the rates. At present two things happened when a Part I. scheme was put in force—the occupants of the demolished houses flocked into adjoining districts, rendering them insanitary, and the people who took up residence in the dwellings erected on the site were not those of the demolished houses, who could not pay the rent demanded. In London schemes, it appeared that the cost to the ratepayers averaged £55 for each person displaced from an insanitary area, and after making deductions for street and other improvements, Mr. Blashill was satisfied that a large proportion of this amount had been expended on the land, which had to be bought at market value. This expense left nothing for good buildings which could be let at the same rent as previously paid. His idea was, that where an insanitary area was owned by one freeholder, he should be made to improve it; and where there were several, that a trust should be compulsorily formed, the land to be vested in the trust, and the leaseholders compensated. Any profit or loss would be borne equably by the freeholders according to their holding in the trust. He calculated that were such a method employed the actual cost would not be a quarter of the present expenditure, and that it would be possible to allow out of the rates for a number of years a sum which would pay the difference between the rents of the new and the old buildings, so that such of the former inhabitants as required to be rehoused on the spot could secure accommodation at the old rents.

Alderman PURCELL said that in Liverpool they had found they had

a large number of insanitary houses occupied by 70,000 people. They could not turn out such a number of people all at once, as they could not rehouse them. They saw that the Act of 1890 would be expensive, so they obtained an Act for themselves. They were dealing with about 500 houses per year, and had already demolished 4,200, while 800 had been erected by the Corporation or by private enterprise. They found that these houses were not taken by the people displaced, who were therefore bettered but little, if at all. They then set about erecting a series of houses which could be let at 1s. or 1s. 2d. per room. They had erected 180 such tenements, and the poorest of the persons displaced had the first offer. The Local Government Board at first objected to the style of buildings, but eventually gave way. The houses were not all that one would like, but were a great improvement on what the people previously had to put up with. They were improving on those first erected.

The experience of most of the speakers was that one great difficulty lay in the shortness of the time for which money could be borrowed, and another in the style of house they were required to erect. They held the Local Government Board responsible for both of these hindrances to municipalities desirous of taking action under the Housing of the Working Classes Acts.

THE ANNUAL LICENSING OF COMMON LODGING-HOUSES.

Dr. PORTER (Stockport) read a paper on this subject. He emphasized the necessity for a legal definition of a common lodging-house, and urged that the license should be subject to annual revision. Under the existing general law the rule was, "Once a registered lodging-house, always a registered lodging-house," unless the licensee had as such been three times convicted of an offence against the Public Health Act, or unless the health officer could obtain closure by certifying, under the Housing of the Working Classes Act, 1890, that the house was unfit for human habitation. A house which was not unfit for human habitation might be quite unfit for a common lodging-house; and one reason why Parliament had been successfully asked in Section 101 of the Stockport Corporation Bill, 1899, for power to acquire annual registration of these houses, was in order to be able to deal eventually with the unsuitable places at present registered. It was believed that such a requirement would in addition conduce to the better condition and ordering of all the registered houses in the borough, by making them annually toe the line of sanitary decency, and, as the registered accommodation in Stockport was wholly insufficient, it would enable the Corporation to license temporarily some of the least objectionable of the numerous unregistered places which were structurally unworthy of permanent registration. These places would thus be brought under regular sanitary supervision until, by municipal or private enterprise, sufficient suitable registered accommodation was provided.

A resolution on the lines of Dr. Porter's paper was agreed to by the Municipal Section.

PORT SANITARY WORK.

Mr. MILLAR WILKINSON, Chairman of the Port of London Sanitary Authority, delivered an address on the work done by port sanitary authorities. He drew attention to the fact that sanitation in the mercantile marine was a long way behind sanitation on shore. The sailor still eats and sleeps in a space which, according to law, need not exceed 72 cubic feet—a space which has to include his bunk, bedding,

and all his belongings—too often badly lighted, badly ventilated, and imperfectly warmed. He also alluded to a matter which presses very hardly upon port sanitary authorities, namely, the heavy expense which is thrown upon them in guarding the doors of the country against the importation of infectious disease. The Government and the country generally looked to the port authorities with a great deal of confidence to prevent such importation, but absolutely refused to assist in bearing the expense, the only reason given being the very insufficient one that the work was a local one. Surely, if ever there was an imperial and national work, it was that of defending the kingdom against "plague and pestilence."

VACCINATION STATIONS AND SEAPORTS.

Dr. E. W. HOPE (Liverpool) submitted that seaports, from their constitution, called for all the energies which could be put forward to safeguard them from disease, and they could not afford to dispense with any one of the links in the chain armour which knowledge and experience provide. Taking one consideration with another, perhaps the most troublesome disease to deal with was small-pox. There was only one efficient prevention, namely, efficient vaccination. One of the best vaccinated communities in the country at the present time was the parish of Liverpool, the latest published returns showing that only 4 per cent. of children whose births were registered remained unaccounted for in regard to vaccination. Perhaps it was to this circumstance that the remarkable immunity of Liverpool from small-pox had been owing. But these results had been achieved amongst the shifting population of a seaport through the medium of the vaccination stations. Hence it was that the closure of the vaccination stations had been viewed in Liverpool with much regret. As a matter of fact, it had been found recently in large numbers of cases that between the date of registration of birth and the time allowed for vaccination a large percentage of the families had removed. The result was a notable falling off in the number of successful vaccinations. Apart from the damage which would ultimately result to the public health from any large neglect of vaccination, there came the great and serious injury to the industry and commerce of the port, since the presence of any above a small number of cases was at once the subject of inquiry by foreign consuls, and vessels coming from an infected port were liable to many restrictions, to the very grave prejudice of the trade.

Dr. HERBERT WILLIAMS (London) contended that an inspection of every person on board at the port of departure should be held conjointly by the port medical officer and the ship's surgeon. This inspection should not only be for the purposes of detecting cases of small-pox, but should extend so as to ascertain those persons who were vaccinated, revaccinated, or unvaccinated. Vaccination should be urged and performed at once in the case of all unprotected persons at ports of call where infection might be met with. Only those persons who were adequately protected by vaccination should be allowed to land unless it was their port of destination. He considered it desirable that the Local Government Board should add small-pox to the list of diseases (plague, yellow fever, and cholera) as regulated by their Order.

SEWAGE DISPOSAL.

Several interesting papers were read dealing with the newer methods of sewage disposal by Mr. W. J. Dibdin, Professor Bostock Hill, Mr.

Scott-Moncrieff, Mr. J. Garfield, and Mr. L. P. Kinnicutt (of Massachusetts).

Professor PERCY FRANKLAND, in his introductory address to the Section of Physics, Chemistry, and Biology, remarked that the Rivers Pollution Commission thirty years ago pointed out that chemical purification of sewage was fatuous, and that purification through living porous surfaces was the only way. Bacteriology had now given the reason of that success, and had shown how it may be better managed by providing a more suitable field of operations. Aeration of the soil was difficult to effect, but was pointed out by the Commissioners as an essential factor. A doubt had arisen as to the best way to deal with storm-water in connection with bacteriological methods. Professor Frankland was satisfied that some purification was necessary. For some time after the beginning of a storm, the storm-water was by no means a weak sewage, as it contained the road-washings, collections which had probably accumulated in gulleys, drains, sewers, etc. It was only after the rain had been falling for some time that the sewage became weak. He suggested that the first lot should be impounded, and the weak sewage be passed through the filters at an accelerated rate. After the storm the impounded sewage could be dealt with, giving it the length of time its strength required.

Mr. W. D. SCOTT-MONCRIEFF said that in the bacterial purification of sewage it was not only purification in its best sense that was obtained, but also a supply of nitrogen ready prepared for plant food, which, if generally available, would postpone the pressure of population upon food-supplies among civilized communities for an indefinite period.

Professor BOSTOCK HILL and Mr. GARFIELD considered it now definitely proved that when dealing with ordinary town sewage—that is, one containing but a very small proportion of manufacturers' waste—it was perfectly possible to deal with the organic solids by this means without the aid of preliminary precipitation, and that, therefore, to this extent the sludge problem had been settled.

[With reference to this last remark, it is interesting to note that at the Congress of the Sanitary Association of Scotland, Mr. Melvin, Manager of the Glasgow Sewage Works at Dalnarnock, where chemical treatment is employed, also claimed to have solved the sludge problem in another way. He considers it is wasteful to destroy the sludge, as thereby a valuable fertilizer is lost. Lately farmers have discovered the value of the pressed sludge cake, and are buying it largely at 1s. a ton.]

A resolution was adopted urging the Local Government Board to relax the requirement they usually make, insisting on District Councils providing land for the treatment of sewage effluents (before sanctioning loans for sewage disposal purposes), even in cases in which efficient contact beds were arranged for.

Mr. J. BRIERLY (Public Analyst for Southampton) drew attention to the discharge of *brewers' refuse* into the sewers. He contended that brewers should be compelled to treat the refuse before it left their premises.

Mr. GEORGE THUDICHUM argued that such refuse could be successfully treated by biological methods.

Among other papers which were read at the Congress, mention should be made of one on the "Prevention of Infection in the Milk-supply of Schools," by Dr. C. CHILDS. He suggested that the schoolmaster should take the law into his own hands, and compel the milk vendors to observe

sanitary regulations and to give proper guarantees. In the smaller schools boiling or pasteurization of milk should be made imperative. School authorities could always insert into their contracts such provisions as they think fit, as do many hospitals. Brighton, on the recommendation of Dr. Newsholme, had done this in connection with the hospitals and infirmaries there.

VETERINARY INSPECTORS.

Mr. W. HUNTING reiterated the plea already put forward by Dr. John T. Wilson and Professor D'Arcy Power, that veterinary experts should be appointed for the recognition of disease in animals, either dead or alive. No medical officer of health—certainly no sanitary inspector—could recognise the conditions presented by carcasses prepared for food with the same certainty as a veterinarian. In every large town there were animals capable of infecting human beings with fatal disease; there was food in the form of meat and milk which should be derived only from sound animals; there were hides and hair and wool which might convey disease; and he claimed that no local authority which had regulations to make for the protection of public health, or rules to carry out affecting the lives of animals, did its full duty, either to the general public or to the owner of animals, unless it appointed a veterinary expert to assist the deliberations and see their rule carried out.

RIVERS POLLUTION.

Major LAMOROCK FLOWER had hoped that the establishment of County Councils would have led to some action in checking river pollution, but it seemed they had plenty of work in other directions. He therefore suggested that joint committees should be appointed for watershed areas. This would put a stop to the disagreements which were always taking place between neighbouring authorities whose interests were in conflict. One of the chief objects of the Bill introduced by Sir Francis Powell was to give power to form such Boards.

CISTERNS AND CONSTANT WATER-SUPPLY.

Papers were read in two sections on this subject—in one by Mr. ERNEST COLLINS, in the other by Mr. HUGH ALEXANDER. Both held that cisterns were necessary, even where a constant supply existed. The abolition of cisterns had been found very detrimental where a restrictive supply had of necessity been resorted to, and this was especially so in poor neighbourhoods. Observations to a like effect were made by Colonel Ducat and Dr. Barry, the Commissioners who held the inquiry into the failure of the water-supply in East London in the summer of 1895. They recommended the introduction of a cistern in which the water should be under the same pressure as in the mains. They should be so constructed that dust cannot obtain access to the water.

[Mr. Alexander has devised a "self-cleaning air-tight cistern" which meets these requirements, and is being adopted by the London County Council in its new model dwellings at Millbank, and by Shoreditch Vestry in dwellings which have been erected by Mr. Rowland Plumbe on what was an insanitary area.]

SUPERVISION OF THE ICE-CREAM TRADE.

Dr. E. PETRONELL MANBY (Liverpool), in a paper on this subject, narrated a series of cases of enteric fever which at a fair was traced to

the consumption of ice-cream, which came from a house in which two cases of the disease existed. Both Liverpool and Glasgow had power to deal with premises in which ice-cream or other similar commodity was made or stored, but in Liverpool the Act did not give power to license the premises, as in the case of the Dairies and Cowsheds Order. During the twelve months ending August 12, 1899, 319 persons had applied directly or indirectly for permission to sell ice-cream; 56 persons had been told that owing to the unsuitability of their premises, etc., they must make other arrangements. The aim of the Liverpool authorities had been to get the large manufacturer either to make his present premises thoroughly sanitary, or, failing that, to take new ones; in the case of the small trader, to get him to combine with others in the same business, and to take some suitable building where they could manufacture and store their ice-cream, instead of using their own houses. If, however, a trader wanted to keep his business entirely to himself, he must then strictly conform to the regulations controlling milkshops.

A NEW HOSPITAL DESIGN.

Mr. WILLIAM HENMAN described a hospital he was erecting in Belfast on somewhat novel lines. He held that with natural ventilation the pavilion system of hospital construction was doubtless the best, but even under the most favourable circumstances it was difficult at all times to maintain sufficient ventilation. Especially was this so at night time, when the condition of the outer atmosphere was such that windows on opposite sides of a ward could not be freely opened, and in close, hot weather. The Plenum method of ventilation enabled the air-supply to be under perfect control, but where it was to be adopted the pavilion arrangement was unnecessary. Mr. Henman therefore advocated that it would be better to spread out the wards on one story only, placed side by side, and lighted by continuous lantern lights. He had constructed the Royal Victoria Hospital in Belfast on these lines. There were 300 beds; the wards were under one roof, and approached by short corridors branching off a main corridor running at right angles to the length of the wards. There were windows at one end of each ward.

Mr. E. T. HALL and Mr. THOMAS BLASHILL were of opinion that the wards must be rather dull places, as there were no windows for the patients to look out of.

NATIONALIZATION OF HEALTH.

Mr. H. H. SPEARS (West Bromwich) gave an able address advocating the establishment of a Ministry of Public Health. He would like to see the sanitary service filled by qualified men giving their whole time and attention to their duties, and having jurisdiction over districts not necessarily continuous with those of a local authority, with powers to take immediate steps for the abatement of deleterious conditions—in fact, that the administration of the Public Health Acts should be in the hands of the State itself.

The necessity for requiring a certificate of efficiency in those applying for the post of sanitary inspector was shown in that during the past year a laundryman, a collier, and a butcher, all without previous training, had obtained appointments as sanitary officers. Mr. Spears deplored the fact that the Local Government Board, which manifested such rigid inflexibility as regards the food of the workhouse inmate, and will not permit a Board of Guardians to deviate by as much as a

currant in the preparation of a pudding, was so feebly apologetic when remonstrating with a local authority on its sanitary shortcomings.

FEMALE HEALTH VISITORS.

Four health visitors were appointed by the Birmingham Corporation in April last, and Dr. Alfred Hill was able to report that already they have amply justified their appointment. As Sir William Preece said in his introductory address, "The appeal to-day is not so much to the authority as to the intelligence of the people. The demand of the sanitary reformer is, therefore, for education, for better teaching of the laws of health both in the schools of the country and also among the people who have arrived at maturity."

MEAT EXTRACTS: THE FOOD VALUE OF "FLESH BASES."—Dr. A. McGill, in a report to the Inland Revenue Department, Ottawa, Canada, observes that much has yet to be done by experimental physiologists before final pronouncement can be made upon the food value (if any) of the flesh bases, which in most instances form the chief portion of the nitrogenous material in meat extracts. The bases certainly differ among themselves in food value, and of course, if this is true of the flesh bases, it is *a fortiori* true of the various forms in which proteid matter occurs in these preparations, viz., as peptones, proteoses, acid albumins, and so forth.

Dr. McGill's experiments suggest that a part of the nitrogen in some meat preparations exists as urea. Urea certainly can have no food value, nor can one readily understand how the allegation that it is of use as a stimulant can be justified. No practical analytical method has been discovered to which nitrogen present as urea can be differentiated from that present as creatin, creatinin, and xanthin.

It is evident that the flesh bases cannot be called food-stuffs in the proper sense of that term. They represent a stage of the process by which complex nitrogenous compounds are changed to simple ones, supplying the energy so set free to the animal organism in the form of vital force. They may still have some food value, since they are not excreted as such, but undergo further simplification, till they appear as urea. It is certain that their food value is very much less than that of proteids proper. When once the urea stage is reached, the urea must be promptly got rid of.

Flesh bases are always present in small amounts in the blood, and in larger amounts in muscle tissue, and when fresh lean beef is treated with hot water the broth contains little more than these bases. Apart from any possible nutritive value, these flesh bases undoubtedly possess a stimulant action on the system, analogous to that exhibited by the alkaloids of tea, coffee, and cocoa, and it is beyond question that to this stimulating effect, rather than to any true nutritive power, they owe such value as they possess.



F.I.C., that there was no added alkali in their cocoa. Mr. Allen adds: "Cocoa naturally contains potassium phosphate, tartrate, malate, and other compounds embraced in the general category of 'alkaline salts,' and the only effect of the treatment to which it is subjected in the process of manufacture adopted by Van Houten is to increase the proportion of these or allied salts to an extent represented by 3 to 3½ per cent. of ash. Van Houten's cocoa contains no ammonia, caustic potash, potassium carbonate, or other compounds to which the term 'alkali' can be properly applied. Hence the statement that 'the long-continued use of alkalies leads to digestive disorder and consequently impaired nutrition,' while true in itself, is wholly inapplicable to Van Houten's preparation. It certainly cannot be contended that the potassium salts which do exist in the cocoa are open to objection on similar grounds, since the total quantity present in a breakfast-cup of Van Houten's cocoa is considerably less than the quantity of such salts contained in a glass of milk, beer, or claret, and is about equal to that in 1½ ounces of bread or lean meat, or in 1 ounce of potatoes."

The real fact appears to be, therefore, that Van Houten's cocoa has added to it some salt, increasing its solubility, which in the ash during analysis is alkali, but is originally a vegetable salt.

There was no special novelty among *disinfectants*. No notice need be taken of the numerous articles of unknown composition posing as disinfectants. Among definite chemical compounds, "Chlorox," of the United Alkali Company, deserves more notice than it has hitherto received. This is a solution of hypochlorite of sodium, four and a half times the strength of the P.B. solution, which is sold at 1s. a gallon, and is a really powerful disinfectant when used 1 in 100. For deodorizing sewage in the proportion of 1 in 15,000, it has been found valuable at Southport, and in the strength of 1 in 500 for watering roads it does not attack iron. The same firm also showed small tins of chloride of lime, each supplied with a measure, holding the amount required to add to a pint of water, as recommended by Dr. Spottiswoode Cameron.

Three methods of vaporizing formalin for disinfecting rooms were on view, but their relative merits, as, indeed, the exact value of aerial disinfection by formalin, require further investigation.

The only disinfecting apparatus on view (except a model of Lyon's disinfecter) was Defries' Equifex, which has proved itself a thoroughly efficient and reliable apparatus. Saturated steam under pressure is used, and an automatic recording gauge is attached, by means of which the duration and sufficiency of each disinfecting operation can be checked.

"RONUK" POLISHES.—We have received samples of these preparations, intended for floors, oil-cloth, shoes, etc., which we have submitted to actual tests in the house and to chemical analysis. In the former respect we find them to be excellent, giving a fine polish, and possessing a fragrant odour; very different to the old "bees' wax and turpentine," and certain other preparations. Chemical analysis indicates that the "Ronuk" polishes are free from strong acids, alkalies, or other deleterious ingredients, and that they will therefore give a good surface without injury to the leather, etc., polished. We feel that we can confidently recommend their use in the house, in hospitals (for waxed floors), and elsewhere.

THE USE OF TUBERCULIN FOR LESSENING THE PREVALENCE OF TUBERCULOSIS AMONG CATTLE AND CHILDREN.*

IS THIS A MATTER FOR GOVERNMENT INTERFERENCE?

By HAROLD SCURFIELD, M.D.,

Medical Officer of Health of Sunderland.

THERE are two reasons why the eradication of bovine tuberculosis is desirable: firstly, in the interests of the agricultural community, and, secondly, because the eradication of bovine tuberculosis necessarily entails a large reduction in the prevalence of one of the most fatal diseases of childhood, namely, tuberculosis or consumption of the bowels. The second reason is my excuse for addressing an audience such as the present on such a subject, though I also claim the ordinary interest of a citizen in the prosperity of every section of the community, and consequently in the delivery of the agricultural section from the ravages of tuberculosis. There is no need, I think, to produce proof to my present audience that cow's milk is capable of causing tuberculosis in those who drink it, but you will perhaps excuse my enumerating a few of the striking features in the chain of the evidence.

1. Tuberculosis in cattle and in man is the same disease, and is caused by the entrance into and growth in the body of the tubercle bacillus. The entrance of the bacillus into the body is so rarely effected before birth, that for all practical purposes it is true to say that every case of tuberculosis is due to infection.

2. Cows suffering from tuberculosis of the udder give milk containing tubercle bacilli.

3. Tuberculosis of the udder is not rare in cows, and milk as ordinarily sold often contains tubercle bacilli.

Thus Bang says: "In any large herd in which tuberculosis is rife one will be certain to find one cow the milk of which contains tubercle bacilli, and which has tuberculosis of the udder."

Out of 144 samples of milk coming from Liverpool cowsheds, 4, or 2·8 per cent., were found to contain the tubercle bacillus; but of 24 samples of milk "from the country," taken at Liverpool railway-stations, 7, or 29 per cent., were found to contain the tubercle bacillus. In some later experiments in Liverpool, 12 out of 228 samples of town milk (i.e., 5·2 per cent.) were found to contain the bacillus, and 9 out of 67 samples of country milk (i.e., 13·4 per cent.). Similar results were obtained at Cambridge.

In Manchester 17 out of 93 samples of country milk were found to contain the tubercle bacillus. By permission of the farmers, the city veterinary officer visited sixteen farms from which the milk came, and on fourteen of these farms he found at least one cow with tuberculosis of the udder.

4. Animals such as calves, pigs, rabbits, guinea-pigs, cats and dogs fed on milk from cows suffering from tuberculosis of the udder develop tuberculosis of the bowels.

* Read before the Newcastle Farmers' Club, April, 1899.

For obvious reasons one cannot try feeding experiments on human beings, and it is also equally obvious how difficult it is in the case of a human being who develops tuberculosis of the bowels to find out from what cows milk was obtained before the onset of this insidious illness. Instances can, however, be quoted which are almost equivalent in value to feeding experiments on the human being. Here is an example cited by Nocard: The seventeen-years-old daughter of a doctor in Geneva had perfect health up to the end of 1892. No case of tuberculosis had occurred either on the father's or the mother's side of the family for several generations. In 1893 she began to waste away without the doctor being able to assign a cause for the wasting, and she died in a few months. A post-mortem examination showed that tuberculosis of the bowels was the cause of death. Further inquiry showed that the family used to spend every Sunday at a small estate on the hills, and that this young girl was particularly fond of milk fresh from the cow. Four of the five cows on the estate, when tested with tuberculin, were found to react, and were slaughtered. Two of the four had tubercular disease of the udder.

5. Human beings contract tuberculosis of the bowels just at the period of life when cow's milk forms the principal item in their diet.

6. The sanitary improvements of the last forty years have reduced the death-rate from tuberculosis of the lungs by 45 per cent., or nearly one-half. During the same period the death-rate from tuberculosis of the bowels among infants under one year old has increased by 27 per cent., and this increase has been coincident with an increase in the proportion of infants reared on the bottle instead of on their natural nutriment.

Tuberculosis of the breast is very rare in the human mother, but tuberculosis of the udder is comparatively common in the cow. We have, then, to contemplate the suggestive fact that the transfer of the infant from the rarely tubercular breast of the mother to the frequently tubercular udder of the cow has been coincident with an increase in the prevalence of tuberculosis of the bowels in the infant, and that this increase has taken place during a period when the prevalence of other forms of tuberculosis in the human being has been rapidly decreasing.

In concluding these preliminary remarks, I will quote two sentences from the report of the Royal Commission of 1890. They are as follows:

"The milk of cows with tuberculosis of the udder possesses a virulence which can only be described as extraordinary," and

"No doubt the largest part of the tuberculosis which man obtains through his food is by means of milk containing tuberculous matter."

The opinion of those most competent to judge is that tuberculosis in cows is the great cause of tuberculosis of the bowels in children.

How is the Danger to be avoided?—1. Firstly, the milk may be boiled, pasteurized, or sterilized. Many people do not like the flavour of boiled milk, although I think in most cases the taste can be acquired. Of course, to give complete security the milk from which butter and cheese are made should be pasteurized as well as the rest of the milk. There can be no doubt that a number of other diseases as well as tuberculosis of the bowels, more especially infantile diarrhoea, would show a great decline if the boiling of milk before use became a universal custom; but there seems to be little likelihood that the British public as a whole will, for a very long time to come, take to boiling their milk. The very people who from their surroundings are most liable to tuber-

culosis would be those who would, from carelessness or ignorance, omit this precaution. Besides, no one nowadays seriously suggests that a community should go on drinking polluted water because it can be rendered innocuous by boiling or by passing it through a Pasteur-Chamberland filter; so why should one advocate drinking milk containing disease germs because it can be rendered harmless by boiling? At the best it is a poor policy to recommend the boiling of the milk and to make no effort to extirpate the disease in the cows.

2. The danger may be lessened by frequent inspection of the dairy cows by veterinary surgeons.

The Copenhagen Milk Company employ veterinary surgeons to inspect their cows every fortnight.

Tuberculosis of the udder comes on so insidiously that a cow may give milk containing tubercle bacilli for several weeks before the disease is detected, even with fortnightly inspections. Tuberculosis, even when generalized, often has so little effect on the condition and nutrition of the cow, that it is quite possible for a cow to have general tuberculosis and tuberculosis of the udder before a veterinary surgeon, by ordinary methods of examination, can say for certain that it has tuberculosis at all.

Fortnightly inspection of all dairy cows by veterinary surgeons may, I think, be dismissed as impracticable of general application on account of the expense, and as being only a makeshift precaution, even if it were practicable.

3. Thirdly we come to the tuberculin test.

It seems not improbable that the name of Koch will go down to posterity, not, as was at one time thought, as the discoverer of a cure for tuberculosis, but still as one of the greatest benefactors of humanity by his having provided in tuberculin a means for the eradication of bovine tuberculosis, and in consequence a means for the prevention of one of the most fatal forms of human tuberculosis.

The leading veterinary authorities of Denmark, a country which depends more upon agriculture for its prosperity than any other country in Europe, have now for many years recognised the value of the tuberculin test, and the Danish Government has for several years provided farmers with the tuberculin test free of charge, on condition that they isolate the sound from the reacting animals. The veterinary authorities of France, Germany, Russia, Norway, America, and other countries have endorsed the value of the test. More recently our own Royal Commission has reported that they "consider the tuberculin test practically infallible, provided the test is applied by a competent veterinary surgeon, and that the tuberculin is of a trustworthy quality."

The Royal Agricultural Society of England has recently issued a pamphlet commending the use of the test to farmers.

It seems a pity that the scope of inquiry for the Royal Commissions on Tuberculosis was not made wide enough in the first instance. The first Commission inquired into the extent of the danger from milk and meat. The second Commission inquired into the best means of averting the danger from a human point of view. It almost seems as if there would have to be yet a third Commission for the purpose of determining upon a scheme for the eradication of bovine tuberculosis, and for convincing the present President of the Board of Agriculture that the tuberculin test is a reliable diagnostic of the presence of tuberculosis in cattle.

Schemes for the extirpation of bovine tuberculosis by the use of the tuberculin test depend upon a few established facts:

(a) The tuberculin test is a wonderfully reliable diagnostic of the presence of tuberculosis in cattle long before the disease has become infectious.

(b) No animal can develop tuberculosis unless the tubercle bacillus finds an entrance into its body.

A sound animal will remain sound unless it is exposed to infection, and a sound herd will remain sound unless an affected animal is introduced among them.

(c) The tubercle bacillus is not ubiquitous, but is only found in the diseased parts and the discharges from the diseased parts of affected animals. The bacillus only lives a few weeks after its expulsion from the body, and is quickly killed by sunlight, fresh air, and disinfectants.

The expression "the ubiquitous tubercle bacillus" is as unfortunate as it is untrue. Even in countries where the disease is very prevalent, it is not uncommon to find herds entirely free from the disease. Thus, Bang states that, out of 5,306 herds examined in Denmark, 1,132 were entirely free from the disease, and some of these sound herds were composed of very heavy milkers.

(d) It is extremely difficult for the bacillus to pass from mother to calf before birth, and the calf of a tuberculous cow is, with very rare exceptions, born free from tuberculosis; and if such a calf be separated from its mother directly after birth, it will remain free unless exposed to infection.

As Nocard says, "The offspring is born tuberculizable, not tuberculous." One animal is, perhaps, more likely to resist infection than another, but it is not by any means proved that the calf of a tuberculous cow inherits any special predisposition to the disease.

Bang, who has probably done more work than anybody else in the solution of this problem, says: "Concerning the mysterious predisposition which is so often spoken of, I will not deny the possibility of its existence, but up to the present we know nothing for certain about it."

What I wish to bring before your notice to-day is, firstly, what can be done while the Government is making up its mind, and, secondly, some suggestions as to what the Government might make up its mind to do.

A demand is gradually springing up in the country for milk from tubercle-free herds. The dairy-farmer can answer this demand by only keeping and only buying animals which are certified to be free from tuberculosis by a veterinary surgeon's examination, which is to include the application of the tuberculin test. He may elect to have his whole herd tested, and get rid of the reacting animals quickly, which will be a costly process; but as most dairy farmers only keep their cows for one milking, he will probably elect to obtain a tubercle-free herd in about a year by the more gradual process of only buying tested animals. He may be able to buy such animals from a breeder, but more probably he will buy from a dealer on condition that the animal, if it fails to pass the test, will be returned. Whichever way he buys, each cow will probably cost him £3 or £4 more than cows bought in the ordinary way. He will also have to provide separate byre accommodation for the sound and for the reacting or untested animals. He may be able to accomplish this by temporary partitions. He will, at any rate, have to

thoroughly disinfect and cleanse the byre, or division of the byre, into which the sound animals are put.

During the process of acquiring a tubercle-free herd, there is no equitable reason why he should not sell the milk of the whole of the cows as before. The cows are none the worse for the application of the tuberculin test, and the milk of the herd mixed is no more dangerous because the dairy farmer happens to know which cows are tuberculous and which are not than it was when he was in a state of blissful ignorance. In fact, the public will have greater security, because the dairy farmer will naturally be on the look-out for the development of udder disease in the cows belonging to the reacting part of the herd during the period that elapses between the testing and their departure from the farm. If he adopts the gradual process of acquiring a tubercle-free herd by only buying tested animals, there is also no reason why he should not use the milk of the untested animals until their departure from the farm.

If the breeder goes in for the system, he will have the whole of his stock tested, and place the sound and reacting animals in separate byres. He will remove the calves of the reacting cows to the sound section immediately after birth, and have them tested when they are a few weeks old. He will boil the milk of the reacting cows before using it, and will get rid of all the reacting animals as soon as he conveniently can.

How is the Dairy-farmer to be repaid for his Outlay?—1. In the first place, the dairy-farmers who take up the matter first will undoubtedly secure increased custom.

2. In the second place, the dairy-farmer will be able to get 2d. a pint for his milk from his private customers. Many dairy-farmers in this district supply milk to private customers at 1½d. a pint. If it pays to supply milk under ordinary circumstances in small quantities at 1½d. a pint, it will certainly pay better to keep only tubercle-free cows and supply milk at 2d. a pint. I know that some customers in my own district are now paying 2d. a pint for milk from tested cows, who formerly paid 1½d. a pint for milk supplied under ordinary conditions.

3. In the third place, wholesale customers will pay more for milk from tubercle-free herds, notably hospitals and schools. The Infectious Diseases Hospital at Sunderland pays 1½d. per gallon more than formerly, the Sunderland Infirmary about 2d. more per gallon. The Monkwearmouth and Southwick Hospital, the Co-operative Society, and many schools in the district, are also paying increased prices for such milk.

4. In the fourth place, the dairy-farmer will be saved from further losses from tuberculosis, and will get a better price for his cows from the butcher, owing to their being free from tuberculosis.

To sum up, the dairy-farmer who goes in for the system at present will have to pay about one-sixth more for his cows, but to balance that he will have increased custom, a somewhat better price for his milk, no further losses from tuberculosis, and a better price for his cows when sold to the butcher.

If the dairy-farmers go in for the system, the breeders will soon find that it is worth while to follow suit, because they will be able to get £2 or £3 extra for every tubercle-free animal they sell. I am glad to learn that some of the breeders in Wensleydale are going in for the test, as the result of the action of the dairy-farmers in the Sunderland district.

I believe that sanitary authorities, by giving certificates to dairy-farmers who keep only tubercle-free cattle, and by advising hospitals, schools, institutions, and the general public of the danger of tuberculous milk, can greatly encourage the movement, and that if this were done more generally, the increase in the number of dairy-farmers and breeders keeping only tubercle-free cattle would soon have an appreciable effect in reducing the proportion of tuberculous cattle in the country.

Every additional tubercle-free herd means an addition to the number of cows that are being protected from infection, and ultimately a diminution in the prevalence of bovine tuberculosis as a whole.

I believe that the extended application of the voluntary system will, by drawing attention to its advantages and drawbacks, hasten legislation on the subject.

Drawbacks to the Voluntary System.—(a) Firstly, there is the difficulty in buying. If the dairy-farmer cannot buy tubercle-free animals from the breeder, he has to buy conditionally from a dealer, keep the animal a week, have it tested, and return it to the dealer if it fails to pass, making some payment to the dealer as a compensation. This returned reacting animal goes to the market again, and is sold to a farmer who is not buying tubercle-free animals. As probably about half of the second farmer's stock will be tuberculous, this does not perhaps matter very much, but it would be preferable if "reacters" went to the butcher.

(b) A more serious objection is that sometimes a tuberculous animal, if it is tested twice, with only a short interval between the tests, will react the first time and not the second. This fact leaves a loophole for fraud, and it would be exceedingly hard on a progressive farmer, who had gone to the expense of securing a tubercle-free herd, to have palmed off on him as sound a tuberculous animal which had simply failed to give a reaction at the second test. This failure to react at the second test is not the usual thing, but is common enough to constitute a danger. Recently one of the Sunderland veterinary surgeons tested four cows twice in a fortnight. Three out of the four reacted to the second test.

In another case a cow was taken on trial by a Sunderland farmer, and tested on December 3rd. It gave a reaction, and was returned to the dealer. This cow then went to Chester-le-Street, Sunderland, Haswell, Stockton, Gateshead, and finally back to Sunderland, where it was sold to another Sunderland farmer. It was again tested on December 21st, and gave a more pronounced reaction than it did the first time.

(c) In the third place, the extension of the voluntary system will be in proportion to the demand, and as it is quite certain that the great mass of the British public do not take much interest in the sources of their milk-supply, the demand will be a very limited one. That section of the community whose circumstances and surroundings render them most vulnerable to the attacks of the tubercle bacillus will be the section least likely to be supplied with tubercle-free milk.

It appears to me that as the law stands at present the voluntary use of the tuberculin test is deserving of every encouragement, but that, as the voluntary system is only capable of very limited extension, and on account of the objections to it that have been mentioned, it is necessary that the Government should come to the rescue.

I now pass on to what the Government might do, or rather to what, with all humility, I think the Government ought to do.

I would suggest that the Government should enact:

1. That injections of tuberculin be only made by duly qualified veterinary surgeons.

2. That every veterinary surgeon who employs the tuberculin test be bound under a penalty to brand every animal which reacts.

3. That the tuberculin and the services of a veterinary surgeon to perform the test be offered free of charge to any farmer or breeder who will agree to isolate the sound from the reacting animals, and that compensation be paid for any of the branded reacting animals, which, on being slaughtered within a reasonable time—say one year—is found to be unfit for food.

4. That the sale of branded animals, except for slaughter, be prohibited.

5. That any obviously tuberculous animals found among the stock on the arrival of the veterinary surgeon to perform the testing be slaughtered without compensation, except in case of failure of diagnosis.

6. That any butcher buying a branded animal be obliged to apply to the meat inspector of his district for the purpose of ascertaining whether the carcass is fit for food, and what organs require to be destroyed. Condemnation to be meted out on the lines laid down by the last Royal Commission.

The duties of meat inspector would naturally fall to the veterinary surgeon appointed for the purpose of the Contagious Diseases (Animals) Acts.

7. That the milk of the branded cows be not sold for human consumption unless an arrangement is made for their periodical inspection by a veterinary surgeon, to ascertain that the udders are free from disease.

8. That local authorities be empowered to compel the slaughter of cows suffering from tuberculous disease of the udder, or advanced tuberculosis, compensation only to be paid in the case of wrong diagnosis and animals branded under enactment 2.

9. That the local veterinary surgeons carrying out the provisions of the Contagious Diseases (Animals) Acts be appointed to carry out these enactments.

Part of the extra salaries required could be obtained by doing away with the travelling inspectors of the Board of Agriculture, who, without any technical training, go about the country in case of swine fever outbreaks, etc., to perform work which could be much more efficiently and promptly done by local veterinary surgeons. The local veterinary surgeons would thus be practically veterinary medical officers of health. In France there is, I believe, such a veterinary health officer in each district.

10. That after the lapse of, say, five years from those enactments becoming law, (a) no compensation for condemned carcasses be given; (b) the sale of milk from any tuberculous cow be forbidden, and local authorities be empowered to use the tuberculin test, any animal reacting to the test to be isolated and fattened for the butcher as quickly as possible without compensation; and (c) all cattle be sold with an implied warranty that they are free from tuberculosis.

How would such a scheme affect the farmer? He would get rid of his losses from tuberculosis, and his expenses would be the provision of separate byre accommodation for the sound and reacting animals, and the fees of the veterinary surgeon for the periodical inspection of the branded cows, if he wished to continue selling their milk.

The calves of the branded cows would be removed to the sound section immediately after birth, and would remain there unless they showed a reaction when tested a few weeks after birth.

He would have a ready sale for the branded animals, because the butcher would run no risk of loss in buying them.

He would risk considerable loss if he did not go in for the system before the close of the compensation period, so that this apparently voluntary use of the tuberculin test would be practically compulsory.

As the breeder under this scheme would be able to rear tubercle-free animals without much expense, the dairy-farmer would only have to pay a very slightly increased price for his newly-purchased tubercle-free animals.

How would the scheme affect the butcher? The butchers would be able to buy branded animals without fear of loss, and would soon learn that most branded animals had only a slight amount of disease about them and were fit for food.

The butchers would also soon learn that their risk lay in buying unbranded animals, and they would probably combine to throw the loss from a condemned carcass on the seller, and thus bring pressure on farmers and breeders to go in for the testing scheme. The butchers in the Isle of Man at present combine so as to throw the loss from condemned carcasses on the seller.

How would the scheme affect the community? The risk from tuberculous milk and meat would in a few years be probably almost abolished. The cost of accomplishing this would chiefly fall on the community, but there is very much more reason for throwing the cost of extinguishing bovine tuberculosis on the community than there is for similar action in the case of swine fever and pleuro-pneumonia, diseases which cause no danger to human life. The estimates that have been made show that the cost in compensation would not be very great, as only a small percentage of the reacting animals would be found to be unfit for use as meat. On the subject of compensation the minority report of the last Royal Commission seems to me eminently fair.

The report says:

"It has been shown to our satisfaction that it is impossible to detect the presence of limited or localized tuberculosis in the living animal from its outward appearance. Even when generalized—that is, when it exists to an extent which may justify the condemnation of the carcass after slaughter—the animal may betray no signs of the disease."

And again:

"Scientific knowledge of the character of the disease is so recent that the ordinary agriculturist cannot be blamed for its prevalence in his stock. It seems, therefore, equitable to protect him against being made the scapegoat of the general ignorance which prevailed till recent years. But as soon as the proper treatment and precautions have been formulated, it will become his duty as well as his interest to put himself beyond risk of loss by confiscation."

In the scheme which I have endeavoured to sketch out, compensation would only be given in cases where an organized effort was being made to extirpate the disease. Compensation under any other circumstances would not be justifiable. The scheme would not throw much expenditure on the farmer, would entail no loss for the butcher, and would not prove very costly for the community.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

June 6th, 1899.

A. L. SMITH, L.J., RIGBY, L.J., AND VAUGHAN WILLIAMS, L.J.

WALSHAW v. BRIGHOUSE CORPORATION.

Local Government—Condemnation of meat unfit for food of man—Compensation—Arbitration—Jurisdiction of arbitrator—Costs of magisterial proceedings—Public Health Act, 1875 (38 and 39 Vic., cap. 55), Sections 116, 117, and 308.

Where meat has been condemned and ordered to be destroyed by a magistrate as unfit for the food of man, and the owner of the meat claims compensation under Section 308 of the Public Health Act, 1875, the arbitrator appointed to award compensation under that section has jurisdiction to decide the question of the soundness of the meat, and may award as part of the compensation the expenses incurred by the claimant in proceedings before the magistrate.

APPEAL by the defendants from a judgment of Day, J., without a jury.

The facts were these: The sanitary inspector and the medical officer of health for the district of Brighouse, acting under Section 116 of the Public Health Act, 1875, inspected a carcass belonging to the plaintiff, which had been deposited at the public slaughter-house at Brighouse for the purpose of preparation for sale, and was intended for the food of man, and came to the conclusion that the carcass was diseased and unfit for the food of man. They thereupon showed it to a Justice of the Peace, who on October 19th, 1897, upon examination and inspection, found that the carcass was diseased and unfit for the food of man, and acting under Section 117 of the Public Health Act, 1875, and Section 28, Sub-section 2, of the Public Health Act, 1890, ordered it to be destroyed, and it was destroyed accordingly. A summons was then issued summoning the plaintiff to appear before a court of summary jurisdiction to answer an information laid by the medical officer to the effect that the carcass belonged to the plaintiff, and was deposited for the purpose of preparation for sale, and was intended for the food of man, and was diseased, and to show cause why he should not be fined or imprisoned under Section 117 of the Public Health Act, 1875. This summons was dismissed upon the ground that as the carcass was not in the possession of the plaintiff, or exposed for sale, there was no offence under that section. No order was made by the justices as to costs, and no further proceedings were taken against the plaintiff.

The plaintiff, not being content with the finding of the magistrate that the carcass was diseased and unfit for the food of man, made a claim against the defendants, the local authority, for damage sustained by him by reason of the exercise by them through their officers of their powers under Sections 116 and 117 of the Public Health Act, 1875, in certifying that the carcass was diseased, and having the same condemned and destroyed accordingly. The defendants disputing the fact of damage

and the amount of compensation (if any) to be paid, the plaintiff appointed an arbitrator under Sections 308 and 179 of the Public Health Act, 1875, and gave notice to the defendants of the appointment. The defendants took no steps in the matter, and accordingly, by Section 180 of the Public Health Act, 1875, the arbitrator appointed by the plaintiff became sole arbitrator between the parties. At the hearing the plaintiff tendered, and the arbitrator, overruling the defendants' objections, admitted evidence that the carcase was sound, wholesome, and in every way fit for the food of man on October 19th.

The arbitrator in due course made his award, which, after reciting the facts above stated, continued in these words:

"I find as facts: 1. That the seizure and condemnation of the said carcase was made. . . . 2. That the said magisterial information was laid and dismissed as alleged. 3. That the said carcase was not diseased, or unsound, or unwholesome, or unfit for the food of man on the said 19th day of October, 1897, when the said order to destroy the same was made. 4. That the said carcase on the 19th day of October, 1897, when the same was ordered to be destroyed as aforesaid, was sound, wholesome, and fit for the food of man. 5. That the said David Walshaw, by reason of the exercise of the said powers, has sustained damages as follows:

	£	s.	d.
"(a) The loss of the said carcase	7	10	0
"(b) Expenses of and incident to the said seizure, and of and incident to defending himself in the said magisterial proceedings	87	1	0
"(c) Loss in his said business which immediately and necessarily flowed from the said seizure, condemnation, and magisterial proceeding	52	0	0
	£96	11	0"

The arbitrator further ordered and directed that the defendants should pay to the plaintiff his costs of and incidental to the reference and costs of the award, and that the defendants should bear their own costs of the same.

The plaintiff brought an action upon this award, and the case was heard at Leeds before Day, J., without a jury. Evidence that the carcase was unsound and unfit for the food of man was tendered by the defendants, but rejected by the learned Judge, who gave judgment for the plaintiff.

The defendants appealed.

Macmorran, Q.C., and *T. R. D. Wright*, for the defendants: The arbitrator had no power to deal with the question whether the carcase was sound or not. That was a question going to the liability or default of the plaintiff. The extent of the arbitrator's powers is defined by Section 308, as interpreted by the House of Lords in *Brierley Hill Local Board v. Pearsall* [1884].* "The fact of damage" and "the amount of compensation" are the only questions which the arbitrator has power to decide. He cannot enter on the question whether or not the claimant for compensation is "himself in default." That is a question of law which ought to have been raised and decided in an action on the award, not in the arbitration. The plaintiff came before the arbitrator as a person himself in default, the carcase having been

* 54 L. J., Q.B. 25; 9 App. Cas., 595.

de facto condemned. The magistrate's finding was intended by the Legislature to be conclusive on the question of the soundness of the meat, except as a foundation for criminal proceedings—*Waye v. Thompson* [1885]*—and the arbitrator ought to have proceeded on that basis. It was never intended that he should sit on appeal from the magistrate's finding. The proper tribunal for that is the Court of Quarter Sessions—Section 269—or, at the instance of the local authority, the High Court—Section 107. The whole duty of the arbitrator was to assess the damages—*Davies and Rhondda Urban Council, In re* [1899].† Even if he has to decide on the soundness of the meat in order to arrive at the fact of damage, his finding on the question of soundness is not conclusive, so far as that question goes to the liability of the appellants. Their liability is a question of law which ought to have been dealt with by the Court below—see *per* Lord Fitzgerald, *Brierley Hill Local Board v. Pearsall*.‡ The learned Judge ought, therefore, to have admitted evidence and given judgment on this point, and he was wrong in holding that the finding of the arbitrator was conclusive.

The expenses of the proceedings before the magistrate are not damage sustained "by reason of the exercise of any of the powers of this Act." The summons was taken out under the Summary Jurisdiction Acts, and the order made thereon is an order not of the local authority, but of the court of summary jurisdiction. The plaintiff may have a right at common law to damages for instituting proceedings without reasonable and probable cause, but he cannot recover them under the Public Health Act.

[*A. L. SMITH, L.J.*: *Bater and Birkenhead Corporation, In re* [1893],§ is against that contention.]

There the claimant for compensation had incurred expense in defending himself from the exercise of the powers of the Act by calling witnesses as to the condition of the meat before the Justice who was asked to condemn it. Not so here. No more compensation can be recovered under Section 308 than could be recovered in an action of trespass—*New River Company v. Johnson*? [1860].|| The magistrate made no order as to costs, and accordingly the costs of the proceeding before him could not be recovered in an action of trespass, and therefore cannot be recovered under Section 308.

Scott Fox, Q.C., *W. J. Waugh*, *W. Madden*, and *G. P. Walker*, for the plaintiff, were not called upon.

A. L. SMITH, L.J.: The arbitrator has drawn his award in the right form. It is not in form a decision on the question of the appellants' liability, but is a finding of facts upon which a court of law may decide that question. By Section 308 of the Public Health Act, 1875, "Where any person sustains any damage by reason of the exercise of any of the powers of this Act in relation to any matter as to which he is not himself in default"—the respondent says he has suffered such damage—"full compensation shall be made to such person by the local authority exercising such powers"—I will deal with the compensation presently—"and any dispute as to the fact of damage or amount of compensation shall be settled by arbitration." What is the meaning of "the fact of damage"? These words have been construed by Lord Selborne and

* 54 L. J., M.C. 140; 15 Q.B. D., 342. † 107 L. T. J., 62.

‡ 54 L. J., Q.B., at p. 29; 9 App. Cas., at p. 603.

§ 62 L. J., M.C., 107; [1893] 2 Q.B., 77.

|| 29 L. J., M.C., 93; 2 E. and E., 435.

Lord Fitzgerald in *Brierley Hill Local Board v. Pearsall*.^{*} Lord Selborne there says: "That matter of fact no doubt cannot be ascertained without dealing with the actual state of facts, whatever it may be found to be; and that actual state of facts may possibly raise questions of law as to what is or what is not done properly 'in the exercise of any of the powers of the Act,' and also as to what is and what is not a default on the part of the claimant. But the inquiry does not cease to be an inquiry into the facts, though the facts may raise questions of law. If the arbitrator goes into the inquiry, as he ought, as a question of fact, and if he deals with the facts as he finds them, but deals with them in a wrong view of those facts according to law, then no doubt his award will not be final." But it is not suggested that the arbitrator in this case has dealt with the facts in any wrong view. Then Lord Fitzgerald says: "In establishing his case under that section"—Section 308—"the plaintiff had to sustain four propositions, viz., first, that he had sustained damage; secondly, that such damage had been occasioned by reason of the exercise by the local authority of the powers of the Act; thirdly, that such damage arose in relation to some matter as to which he was not himself in default; and, fourthly, the amount of compensation to which he was properly entitled. Any dispute as to propositions 1 and 4 is to be settled by arbitration. The fact of damage comes first in the section, and is the foundation of all the rest. In the execution of his duties, it is difficult to see how the arbitrator can avoid inquiring whether the acts complained of were matters done in the exercise of the powers of the Act, and as to which the claimant was not himself in default, so as to limit the scope of his assessment of compensation; but his decision, if any, as to the liability of the defendants in point of law would not be binding, and would be inoperative." If the award involves an error in law, it is open to the party sued upon the award to set up the question of law as a defence to the action. Here the arbitrator finds that in exercise of and accordance with or pretended exercise or virtue of the powers and provisions of the Public Health Act, 1875, the defendants by their officer on October 19th, 1897, seized the carcase and caused the same to be condemned by a Justice of the Peace; and that the carcase was not diseased, or unsound, or unwholesome, or unfit for the food of man on October 19th, when the order to destroy the same was made. It is said that he ought not to have gone into the question of the soundness of the meat. But how otherwise could he find the fact of damage? In order to find that fact he must go into the question of the soundness. Then it is said he has not addressed himself to the question whether the claim for compensation was in relation to a matter as to which the claimant was not himself in default. But if the carcase was sound, how was the claimant in default? It is argued that he was in default immediately on the finding by the magistrate that the carcase was unsound. But unless it was unsound in fact, he never came within Sections 116 and 117 at all.

The plaintiff having thus lost the carcase and been put to expense, it is next contended that the damage was not caused through the act of the defendants. But it was all the result of a blunder by their officer acting in the course of his duty. Then it is said that he cannot recover the £37 1s., the expenses of the proceedings. I ask myself, Why not? The words of Section 308 are "full compensation shall be made." The

^{*} 54 L. J., Q.B., 25; 9 App. Cas., 595.

only question is, Had the plaintiff £37 1s. less in pocket through the action of the local authority? It is said that these expenses are costs; but *Bater and Birkenhead Corporation, In re*,^{*} is an authority that they may be recovered notwithstanding. True, in that case the claimant for compensation appeared before the Justice to show cause why the meat should not be condemned; but what difference does it make whether the expense is incurred before or after condemnation? In the words of Lord Esher, M.R., "We are bound to read Section 308 in its ordinary and grammatical sense. The words used are very wide, and it seems to me that they must include any pecuniary loss which a man suffers when he is not himself in default." I think these are expenses for the payment of which the respondent was entitled to full compensation, and this appeal must be dismissed.

RIGBY, L.J.: I am of the same opinion. It is the duty of the arbitrator to make his award upon the fact of damage and the amount of compensation. He could not do this without investigating the question whether the carcase was sound or not.

VAUGHAN WILLIAMS, L.J.: I entirely agree as to the result of the decisions in *Brierley Hill Local Board v. Pearsall*.[†] There can be no doubt that the arbitrator was acting within his jurisdiction in finding that the meat was unsound, and his finding cannot be disputed by anyone interested. I understood at one time in the argument that it was meant to be suggested that there had been a judicial order condemning the meat and determining its unsoundness. In my judgment, the order for condemnation of the meat under Section 117 is nothing of the sort. I do not say that in some cases an order made under that section might not be judicial, so that it would have to be got rid of to enable the parties to raise the question of fact again, but in this case it is clear that the order was administrative, and not one that would have to be got rid of before compensation could be obtained.

As to the costs incurred in consequence of the summons, it is not disputed that the inspector and the medical officer were officers of the defendants, and that the defendants are responsible for whatever was done by them. But it is said that these costs would not have been recoverable as damages in an action for trespass, and so they cannot be taken into consideration in awarding compensation. With the general proposition as to the recovery of such costs as damages I agree; that is to say, that there could not have been included in the damages in the action costs in respect of which there had been an adjudication by a court of competent jurisdiction; and it may be doubtful whether even under the words "full compensation" such costs could have been included. But even if the case of *Bater and Birkenhead Corporation, In re*,[‡] were put aside as not applicable to this case, it seems to me that there would have been a common-law right in an action of trespass to have these costs considered in the assessment of damages. I entirely agree that if the matter had been before a court which had power to adjudicate upon the costs, and had adjudicated, no one could in any subsequent action go behind that adjudication, or go outside it in any way. But in the present case, as there was no adjudication of any sort or kind on costs, there is nothing to prevent damages or compensation being assessed on the basis of including the costs in the assessment.

Appeal dismissed.

^{*} 62 L. J., M.C., 107; [1893] 2 Q.B., 77.

[†] 54 L. J., Q.B., 25; 9 App. Cas., 595.

[‡] 62 L. J., M.C., 107; [1893] 2 Q.B., 77.

REVIEW OF RECENT BACTERIOLOGY.

THE BACTERIAL TREATMENT OF SEWAGE.—The results up to February last of the treatment of London sewage on the experimental coke-beds at the Southern Outfall Works at Crossness are given by Dr. Clowes in a report* recently presented. The results obtained by the use of coke-bed treatment are compared with those of the ordinary treatment—by chemical precipitation and sedimentation—of the rest of the sewage at the same works, the advantages of the former method being summarized as follows: No chemicals are required; there is no offensive sludge to be dealt with, only an odourless deposit of sand or vegetable tissue; the whole of the suspended matter is removed, instead of only about 80 per cent.; 51·3 per cent. of the dissolved oxidizable and putrescible matter is removed, as against only 17 per cent. by chemical treatment; gold-fish, roach, dace, and perch will live for months in the first effluent from the coke-bed, whereas they die at once if placed in the effluent resulting from the present chemical process. Three coke-beds have been in use. Tanks A and B have each a superficial area of $\frac{2}{3}$ of an acre, and are each 22 feet 6 inches long, by 10 feet 8 inches wide, by 12 feet deep; tank C presents the same superficial area, but is only 6 feet deep. Tank A is filled to a depth of 4 feet, and tanks B and C to a depth of 6 feet, with coke fragments about the size of walnuts. The coke-bed in tank A has a sewage capacity of 3,000 gallons, which is equal to 50 per cent. of the volume occupied by the coke and the intervening air-space, the volume of the coke amounting to 960 cubic feet. The sewage-capacity of the coke-beds in tanks B and C is in each case 4,500 gallons. The sewage, after being roughly screened, is run into the tanks to the level of the upper surface of the coke-bed (this occupies about seven minutes), and after standing for three hours is allowed to flow off slowly by gravitation. The tank then rests for eight hours. Two sets of experiments have been carried out—in the one, tank A has been used for a single treatment of the sewage; in the other, the sewage, after being treated as above in tank C, has been again treated in tank B. The relative amount of purification effected by the chemical and bacterial methods respectively, as estimated by the relative amounts in the crude sewage, and in the several effluents, of dissolved oxidizable matter measured by the quantity of oxygen absorbed from permanganate, is found to be as follows:

	Impurity of liquid.	Percentage purification calculated on Crude Sewage.
Crude sewage	3·696	—
Chemical effluent	3·070	16·9
Coke-bed effluent (single treatment)	1·799	51·3
Coke-bed effluent (double treatment)	1·137	69·2

As to the length of life of these coke-beds, Dr. Clowes has not at present much to say. The sewage-capacity of tank A, after working for ten months, has been reduced from 50 per cent. to 33 per cent. of the total volume of the bed. This reduction of capacity is due to an accumulation of debris, apparently for the most part of a vegetable nature. On Dr. Clowes' figures, it is obvious that the sewage-capacity

* "Bacterial Treatment of Crude Sewage" (Second Report), 1899, London County Council.

of the coke-bed has during the time been reduced by one-third—from 3,000 gallons to 1,980 gallons. Assuming that this reduction will continue at a proportionate rate, the working capacity of the tank after twenty months' use will be only about 1,300 gallons. If, in the continued course of these experiments, it is found that such progressive decrease in capacity does in fact occur, a complicating factor of considerable importance will be introduced into the consideration of the adaptability of the method for dealing with the sewage of large towns.

Dr. Houston adds to the report a full account of the bacteriological condition of the effluent from the 4-foot coke-bed (tank A). The average number of bacteria per c.c. of effluent was about 27·7 per cent. less than in the crude sewage; the reduction in the number of liquefying bacteria per c.c. amounted to about 11·3 per cent. The number of *B. coli communis* in the sewage was on an average "more than 100,000" per c.c., whilst the number of spores of *B. enteritidis sporogenes* varied from 10 to 1,000 in the same quantity, and the corresponding figures in the effluents showed no reduction.

NEW MEDIUM FOR CULTIVATION OF *B. DIPHTHERIE*.—Joos* recommends the use of a serum-agar medium made in the following manner: To 300 c.c. of blood serum are added 50 c.c. of normal soda solution, and 150 c.c. of either distilled water or beef-broth. The flask containing the mixture is then kept for from two to three hours in a water-bath at a temperature of between 60° and 70° C. The temperature of the water-bath is then raised to 100° C., or the flask and its contents are transferred to a steam sterilizer for from one-half to three-quarters of an hour. To the mixture is then added an equal quantity of pepton beef-broth, and 20 grammes of agar. The agar is dissolved as quickly as possible, the liquid filtered whilst still hot, and then sterilized in the autoclave for a quarter of an hour at a temperature of 100° to 110° C. The pepton beef-broth is made with 500 grammes of beef (one day old) in a litre of water, to which are added 20 grammes of pepton, 5 grammes of salt, and 7 to 8 c.c. of normal soda in order to render the broth alkaline. The advantages claimed for the medium are: (1) The serum-agar is easily and quickly made; (2) it can be used in Petri dishes for the isolation of pure cultures; (3) *B. diphtherie* grows very quickly on it, and so a diagnosis can often be made in five or six hours, and always within fifteen hours, with an incubation at 37° C. The colonies of the bacillus on this medium have a constant and characteristic appearance under a low magnifying power. Streptococci will not grow at all on it, and the development of staphylococci is sensibly checked.

THE TUBERCULIN TEST IN CATTLE.—The value of this test is well illustrated in the account† given by Professor J. M'Fadyean, of the Royal Veterinary College, of the results of its application to a herd of dairy cattle on Her Majesty's Home Farm at Windsor. The herd numbered forty animals, all of which were apparently healthy and in good condition. The premises in which they were kept are "probably the best in the kingdom from the point of view of cubic space, light, and ventilation." After inoculation with tuberculin, thirty-four animals gave a definite temperature reaction, the temperature rising within fifteen hours from the normal (about 102° F.) to 104° F., or higher; in two animals the temperature reaction was held to be doubtful, the rise reaching 103·6° F. in one case, and 103·8° F. in the other; in the

* *Centralblatt für Bakteriologie*, 1899, Band xxv., Nos. 8-10.
† *Journal of Comparative Pathology*, 1899, vol. xii., part 1.

remaining four animals no temperature disturbance was observed. In view of these results, it was decided to slaughter the whole herd, and a very careful post-mortem examination was made in the case of each animal, exact details of which are given. Of the thirty-four animals which gave a definite temperature reaction, thirty-three were found to be undoubtedly tuberculous; in the remaining cow no anatomical evidence of tuberculosis was found, but the uterus was in an unhealthy and inflamed condition. Tubercular lesions of limited extent were found in each of the two animals in which the temperature reaction did not quite reach 104° F. Of the remaining four animals in which no temperature disturbance had occurred, three were apparently free from tubercular disease, whilst the fourth showed in a mediastinal gland a caseous nodule, about the size of a pea, which contained fairly numerous tubercle bacilli.

INFECTIVITY OF MILK FROM TUBERCULOUS CATTLE.—Whilst the observations of the majority of those who have interested themselves in this matter leave no doubt as to the infectivity of milk from cows affected with either generalized tuberculosis or with local tubercular disease of the udder, there has been some difference of opinion as to the danger attending on the use of milk from cattle affected with other and lesser degrees of tuberculosis. Lydia Rabinowitsch and Kempner have recently* investigated this latter question. The milk from fifteen cows which had reacted with tuberculin was examined, and the presence of *B. tuberculosis* was proved in the milk of ten, or in about 66 per cent., by means of animal inoculations. Of these ten cows, nine showed, save for the tuberculin reaction, no clinical evidence whatever of tuberculosis. In two of the animals the post-mortem examination showed no obvious tubercular lesion, in spite of the proof afforded by the inoculation experiments that their milk had contained tubercle bacilli. In these two cows the tuberculosis is described as being "latent," but it is obvious that a very careful examination of all the bones would have to be made before the use of this term could be strictly justified.

PATHOGENIC YEASTS.—Amongst the earlier cases of blastomycetic infection recorded was that of Curtis of Lille,† in which a yeast was isolated from a tumour removed from Scarpa's triangle. The tumour had the appearance of a sarcoma which had undergone myxomatous degeneration, and the yeast isolated was pathogenic for rats, mice, dogs, and rabbits. In rats and mice it produced tumours similar to the one removed from the original patient. Nello Biargi‡ records a somewhat similar case, in which a yeast was isolated from a myxo-sarcoma growing in the popliteal region. The parasites were readily recognised in sections of the tumour stained by San Felice's method with lithio-carmin and gentian violet; most of the yeast-cells were seen to be lying between the tissue-cells, but some were intra-cellular. The yeast isolated was pathogenic for lower animals.

Drs. Hyde, Hektoen, and Bevan contribute a joint paper,§ read before the American Dermatological Association, on "Blastomycetic Dermatitis." A case of this nature, occurring in a man aged fifty-seven, is described in which there were extensive skin lesions on the right leg and on the left hand. From the diseased tissues a yeast identical with *blastomyces dermatitidis* of Gilchrist was isolated.

* *Zeitschrift für Hygiene*, 1899, Band xxxi., Heft. 1.

† *Annales de l'Institut Pasteur*, 1896, tome x.

‡ *Il Policlino*, May 15, 1899.

§ *British Journal of Dermatology*, 1899, vol. xi., No. 7.

Details of another similar and hitherto unpublished case are given. The authors also refer to two cases of blastomycetic dermatitis published by Gideon Welles* and Hessler,† which with the cases published by Gilchrist,‡ and Gilchrist and Stokes,§ bring the number of recorded cases of this sort up to a total of six.

INFECTION BY *B. PYOCYANEUS*.—Whilst secondary infections by *B. pyocyaneus* are not very uncommon, primary infections are decidedly rare, and when they have occurred have usually been met with in children. Blum|| records a case of pyocyaneus infection with endocarditis in an infant aged two and a half months. On the day before the child died, a culture of the bacillus was obtained from blood drawn from the lobe of the ear, and a pure culture was also obtained from blood taken from the heart an hour and a half after death. Vegetations containing numbers of the bacillus were found on the mitral valve. A critical review of the recorded cases of "pyocyaneus bacillæmia," with report of a case in which that disease was secondary to a "staphylococæmia," will be found in the *American Journal of Medical Sciences*.¶

ANALYTICAL NOTES.

THE PRESENCE OF LEAD IN FOOD.—Dr. Charles P. Worcester, of Massachusetts, has carried out an examination of the metallic foil used in packing food and the metal stoppers of certain kinds of bottles and jars in which preserved fruits and aerated waters are sold. Dr. Worcester found that lead was present in the form of an alloy in amounts varying from 93.5 per cent. to 0.2 per cent. of the alloy. The contents of twenty-eight metal-stoppered bottles of fruit syrups and beverages were analyzed. Lead was found in all the samples. The maximum amount was 1.05 milligrammes of metallic lead per bottle, and the minimum 0.05 milligramme. The percentage of lead in the stoppers of these bottles varied from 3.5 to 50.7. While the amount of lead found in the contents of the bottles was in no case very large, it was, in the opinion of Dr. Worcester, sufficient to condemn the use of lead in the manufacture of the stoppers. The variations in the amounts of lead found in the contents of the bottles, being quite irrespective of the percentage of lead in their stoppers, may be ascribed to different causes, such as the difference in the amount of acidity in the various liquids and the length of time that the liquid has been in contact with the stopper. Furthermore, the more soluble metal of a double alloy is attacked by an acid with an energy which is not proportional to the percentage of that metal in the alloy.

THE INFLUENCE OF FOOD PRESERVATIVES ON DIGESTIVE ENZYMES. H. LEFFMANN.** The enzymes used in the author's experiments, which had references principally to the digestion of starch, were: Malt diastase (Merck); pancreatic extract (Parke, Davis and Co.); peptenzyme, a

* *Loc. cit.*, August, 1899, p. 153.

† *Journal of the American Medical Association*, March, 1898.

‡ *Indiana Medical Journal*, August, 1898.

§ *Johns Hopkins Hospital Reports*, 1896, vol. i.

|| *Journal of Experimental Medicine*, 1898, vol. iii.

¶ *Centralblatt für Bakteriologie*, 1899, Band xxv., No. 4.

** *Journ. Franklin Instit.*, 1899, through *Analyst*, 102, 1899.

preparation containing all the digestive ferments of the alimentary tract (Read and Garnick); and papain, the enzyme of papaw sold under the name of "caroid." In each experiment 50 c.c. of a freshly-prepared solution of arrowroot-starch (10 grammes per litre) were used. The following results were obtained in a series of experiments with taka-diastase, 11 milligrammes of the enzyme and 50 milligrammes of the preservatives being used in each case, and the solutions diluted to 150 c.c. after the digestion:

1. Salicylic Acid: Showed starch reaction strongly, and only traces of sugar; 133 c.c. of the solution did not reduce 10 c.c. of copper solution (equivalent to 0.046 gramme of dextrose).
2. Sodium Benzoate: No starch present; much sugar formed.
3. Saccharin: Much starch present; traces of sugar.
4. Boric Acid: No starch present; much sugar formed.

With pancreatic extract solution the results were:

1. Salicylic Acid: No sugar formed.
2. Sodium Benzoate: Much sugar formed.
3. Saccharin: Trace of sugar formed.
4. Boric Acid: Much sugar formed.

Saccharin in small quantities (10 milligrammes) interfered with the digestion of starch by taka-diastase (10 milligrammes), by papain (20 milligrammes), and to a lesser extent by peptenzyme. Formalin (3 c.c.) did not affect taka-diastase (11 milligrammes), but 1 c.c. had an injurious effect on pancreatic extract (1 c.c.).

From the results of these and similar experiments, which are given in tabular form, the author has arrived at the following general conclusions: Beta-naphthol is injurious to malt-diastase, but does not seriously affect the starch-converting capacity of the taka-diastase or pancreatic extract. Boric acid, borax and boro-glyceride interfere but little with either starch or proteid digestion. Salicylic acid interferes with the action of most of the enzymes, especially those that convert starch, but does not seriously affect proteid digestion. Sodium benzoate has no appreciably injurious influence on any of the enzymes. Sodium fluoride interferes but little with the digestion of starch, but sodium silicofluoride has a considerable influence on pancreatic extract.

In the author's opinion, if the use of a preservative is to be permitted in food, boric acid and sodium benzoate are the least objectionable, since they have less tendency to disturb the digestive functions than the other preservatives commonly employed.

THE PRESENCE OF MERCURY AND LEAD IN COSMETICS.—A special investigation of hair-washes and face-powders has been made by the analysts of the Board of Health, Massachusetts. Lead was found to be present in amounts varying from 0.3 per cent. to 2.32 per cent. A hair-dye having a large sale in England was found to contain 2.3 per cent. of lead.

Lead-poisoning has been known to occur from the external use of such preparations. Corrosive sublimate, or other poisonous salts of mercury, were found in the proportions of from 1 to 15 grains per ounce. In one instance a 6-ounce bottle contained 47 grains of corrosive sublimate. Another contained 14 grains of bichloride of mercury per ounce. It is not surprising that cases of serious injury result from the use of such preparations.

REVIEW.

MODERN CREMATION: ITS HISTORY AND PRACTICE. Third edition. By Sir Henry Thompson, Bart., F.R.C.S., M.B. Lond. London: Smith, Elder and Co., 1899.

The issue of a new edition of this little book is most opportune, and will enable those who desire to possess the latest information on this important sanitary subject to obtain it in a lucid and most readable form. That there are many medical officers of health and others who require to be able to express "definite opinions" on the subject at the present time, or in the immediate future, is certain. Many of our large cities have either erected crematoria of their own, or have taken the necessary steps for their erection as municipal institutions, or as public companies.

Sir Henry Thompson brought the subject of cremation before the English public by means of an article in the *Contemporary Review* in January, 1874. In the same year the Cremation Society of England was formed, with Sir Henry Thompson as its president, a position he has held ever since. The history of modern cremation in England is so intimately associated with the proceedings of the Cremation Society of England that the present work is largely devoted to the almost insurmountable difficulties which the Society has had to contend with.

The book is divided into six chapters, and there is an appendix containing information in regard to the Cremation Society of England, directions for arranging a cremation, and forms of certificates used in Paris and other French cities. The first three chapters are devoted entirely to the history of cremation; then follow chapters on the value of cremation in cases of death by infectious disease, and the argument for cremation as presented twenty-five years ago and at the present time.

It is almost needless to say that the information given is accurate and to the point, and the book will well repay careful perusal. The only criticism we have to offer is not one as to quality, but rather as to quantity. Those of us who have had to consider the details of construction and cost would wish that Sir Henry had given more of his store of information on these points.

DETECTION OF FORMALIN IN MILK.—In phloroglucin we have the most delicate test for formaldehyde. One or two c.c. of a 1 per cent. solution, with a few drops of liq. potassæ or sodæ added to 8 to 10 c.c. of the milk, give, if formaldehyde be present, a red colour. Vanino, however, points out* that it is not a quantitative test, for in 10 to 30 per cent. solutions of formaldehyde it gives no colour, or only the faintest shade, and in 3 per cent. a rose colour, while the deepest red is obtained with solutions of 0.5 to 0.00004 per cent., and a perceptible tint with 0.000004 per cent. This does not detract from the value of the test in the examination of milk, since only very small quantities are likely to be present, but the depth of the colour must not be taken as an indication of the amount of formaldehyde present.

* *Pharmacologische Centralhalle*, 1899, S. 101.

CORRESPONDENCE.

NEED OF UNIFORMITY IN RECORDING RESULTS OF ANALYSES OF SEWAGE AND WATER.

TO THE EDITOR OF "PUBLIC HEALTH."

DEAR SIR,

At the British Association meeting at Dover this week, the committee appointed to establish a uniform system of recording the results of the chemical and bacteriological examination of water and sewage, of which I am secretary, presented an interim report, and I shall be glad if you will be good enough to give it publicity in your paper. The committee are anxious that all official reports in this country shall be reported in a similar manner, as it will then enable such reports to be compared with one another without calculation. As your paper has a circulation amongst municipal officers and others interested in this question, its publication in your Journal will cause the report to reach those whom I am unable to communicate with personally. It will be noticed that the report urges the adoption of the system of recording the results originally adopted by the Rivers Pollution Commission, and confirmed by the committee of the American Association for the Advancement of Science in 1887, and I believe it is not a breach of confidence for me to add that the Royal Commission at present sitting will also conform to these suggestions. A further advantage of the "parts per 100,000" over "grains per gallon" is that Continental results are always recorded in this manner. The committee hope next year to supplement this report by further recommendations to cover those other points not embodied in the present report, and as secretary of the committee I shall be glad to receive the views of other workers to lay before the committee.

Yours faithfully,

SAMUEL RIDEAL.

28, Victoria Street, Westminster,
London, S.W., September 21st, 1899.

ENCLOSURE.

Water and Sewage Examination Results.—Report of the Committee, consisting of PROFESSOR W. RAMSAY (Chairman), Dr. S. RIDEAL (Secretary), SIR W. CROOKES, PROFESSOR F. CLOWES, PROFESSOR P. F. FRANKLAND, and PROFESSOR R. BOYCE, appointed to establish a Uniform System of Recording the Results of the Chemical and Bacterial Examination of Water and Sewage.

The committee beg to report as follows: That it is desirable that results of analysis should be expressed in parts per 100,000, except in the case of dissolved gases, when these should be stated as cubic centimetres of gas at 0°C. and 760 mm. in 1 litre of water. This method of recording results is in accordance with that suggested by the committee appointed in 1887 to confer with the committee of the American Association for the Advancement of Science, with a view to forming a uniform system of recording the results of water analysis.*

* British Association Report, 1889.

The committee suggest that in the case of all nitrogen compounds the results be expressed as parts of nitrogen over 100,000, including the ammonia expelled on boiling with alkaline permanganate, which should be termed albuminoid nitrogen. The nitrogen will, therefore, be returned as—

1. Ammoniacal nitrogen from free and saline ammonia.
2. Nitrous nitrogen from nitrites.
3. Nitric nitrogen from nitrates.
4. Organic nitrogen (either by Kjeldahl or by combustion, but the process used should be stated).
5. Albuminoid nitrogen.

The total nitrogen of all kinds will be the sum of the first four determinations.

The committee are of opinion that the percentage of nitrogen oxidized—that is, the ratio of 2 and 3 to 1 and 4—gives sometimes a useful measure of the stage of purification of a particular sample. The purification effected by a process will be measured by the amount of oxidized nitrogen as compared with the total amount of nitrogen existing in the crude sewage.

In raw sewage and in effluents containing suspended matter it is also desirable to determine how much of the organic nitrogen is present in the suspended matter.

In sampling, the committee suggest that the bottles should be filled nearly completely with the liquid, only a small air bubble being allowed to remain in the neck of the bottle. The time at which a sample is drawn, as well as the time at which its analysis is begun, should be noted. An effluent should be drawn to correspond as nearly as possible with the original sewage, and both it and the sewage should be taken in quantities proportional to the rate of flow when that varies (e.g., in the emptying of a filter-bed).

In order to avoid the multiplication of analyses the attendant at a sewage works (or any other person who draws the samples) might be provided with sets of twelve or twenty-four stoppered $\frac{1}{4}$ Winchester bottles, one of which should be filled every hour or every two hours, and on the label of each bottle the rate of flow at the time should be written. When the bottles reach the laboratory, quantities would be taken from each proportional to these rates of flow and mixed together, by which means a fair average sample for the twenty-four hours would be obtained.

The committee at present are unable to suggest a method of reporting bacterial results, including incubator tests, which is likely to be acceptable to all workers.

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 Black, S., M.D., B.C., appointed M.O.H. of Braintree R.D.C.
 Brown, J., M.D., D.P.H., appointed M.O.H. of Bacup M.B.
 Buchanan, R. McN., M.B., C.M., appointed bacteriologist to Corporation of Glasgow.
 Davey, E., M.R.C.S., L.R.C.P., reappointed M.O.H. of Walmer U.D.C.
 Francis, H., M.B., B.S., reappointed M.O.H. of Arnold U.D.C.
 Haydon, H. W., M.R.C.S., L.R.C.P., appointed M.O.H. of Wadebridge U.D.C.
 Hitchon, H. H. J., L.R.C.P., M.R.C.S., reappointed M.O.H. of Heywood M.B.
 Housley, J., M.D., M.R.C.S., D.P.H., reappointed M.O.H. of Retford R.D.C.
 Jenkins, J. H., L.R.C.P., D.P.H., reappointed M.O.H. of Usk U.D.C.
 Kenyon, G. R., M.B., reappointed M.O.H. of Hoylake U.D.C.
 Morse, E., L.R.C.P., M.R.C.S., reappointed M.O.H. of Torrington M.B.
 Pearce, G. H., L.R.C.P., appointed M.O.H. of Darton U.D.C.
 Peck, H., M.D., D.P.H., reappointed M.O.H. of Chesterfield R.D.C.
 Rommels, E., M.D., appointed M.O.H. of North Freemantle, Western Australia.
 Ross, J. A., M.B., C.M., reappointed M.O.H. of Penistone U.D.C.
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 Stewart, C. P., M.B., appointed M.O.H. of Perth M.B.
 Thomson, G. D., L.R.C.P., reappointed M.O.H. of Ruskington U.D.C.
 Wallis, P. E., L.R.C.P., M.R.C.S., reappointed M.O.H. of East Grinstead U.D.C.

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PUBLIC HEALTH:

The Journal of the Incorporated Society of Medical Officers of Health.

Vol. XII. No. 2.

NOVEMBER, 1899.

EDITORIAL.

GOVERNMENT AND ITS REMEDY.

The government is theoretically ideal, in as far short of that standard. For one exceedingly difficult in the smaller districts of men to come forward as councillors, or to take an active and continuous part in the work of the council. The result is that a group of individuals, the builder and the house-farmer are only too ready to take the whole control of the district into their hands, and their election for the purpose of log-rolling their own interests, and not those of the electors. Matters relating to the public health and to conscientious officers are under these circumstances only too notorious. Such councils, although not vested with discretionary powers, arrogate to themselves the functions of Parliament and enforce or set aside the law as they please. It seems to us that this class of council does not really represent the electors, and that the members are guided solely by their own peculiar views of local government. We doubt whether the present agitation to get rid of the independence of certain officers, notably at the present juncture of vaccination officers, is little more than an expression of the wish of such councils to get more complete control of the local government. It is curious that their watchword is "Progress," whilst their government is really "retrogressive." Indeed, the result is that in many parts of the country local government, which is democratic in conception, has become oligarchic in the extreme. Of course, a very effectual remedy lies in the hands of the electorate, but it is an almost herculean task to rouse the requisite interest in the elections, and even if roused it is usually only evanescent. We admit that there are many councils animated

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with the highest sense of their duties, but the average small council, urban and rural, is mainly of the unsatisfactory character here described.

The safeguarding of the public health is not a matter of parish politics, and the neglect thereof becomes a national question. Where the management of local government has drifted into the hands of men who either cannot or will not properly enforce the law and deal justly by their officers, and the electorate is too supine to exert itself to set matters right, the council should be superseded and the government be vested in paid officials, who should be appointed either by the Local Government Board or the county council, but the less local influence affects such appointments the better. The powers of such officers are sufficiently prescribed by law, and the interests of individuals safeguarded by the Courts, so that we feel sure that the inhabitants at large would appreciate the change, and that the government would go on smoothly and efficiently, provided the efforts of the official wirepuller and political agitator were rendered nugatory.

THE PRESENCE OF THE KLEBS-LÖFFLER BACILLI IN THE AIR OF A DIPHTHERIA WARD.—H. Richardière and L. Tollemier* have made an interesting series of experiments to discover whether bacilli were present in the air of apartments devoted exclusively to the treatment of diphtheria patients before and after disinfection had been practised. These observations were made in the Bretonneau pavilion of the Hôpital Trousseau. In the first series of experiments the wards had not been disinfected for several weeks. They contained about thirteen diphtheria cases. Two procedures were adopted: in the first the air of the rooms was driven over sterilized bouillon; in the second, Petri dishes containing coagulated beef serum were exposed to the air for varying periods of time. Bacteriological tests were controlled by inoculation of animals. Similar experiments were also made in apartments which had been occupied by diphtheria patients, but had subsequently been disinfected. The result of these observations showed that virulent diphtheria bacilli were present in the dust floating in the air of the Pavillon Bretonneau, which had not been disinfected for a long time, but that they were absent after disinfection. These experiments, therefore, show the importance of frequent disinfection of wards devoted to contagious cases, and the necessity for the precautions of rigid isolation which are carried out in these wards at the present time. They show, also, that it is necessary to employ daily some means of removing, without at the same time stirring up, the dust of such apartments.—*American Journal of Medical Sciences*.

* *Gazette des Maladies Infantiles*, 1899, No. 10.

SECURITY OF TENURE FOR MEDICAL OFFICERS OF HEALTH.*

By T. W. H. GARSTANG, M.A., Oxon., M.R.C.S. Eng., L.S.A. Lond.,
D.P.H. Vict.

Medical Officer of Health to the Bucklow Rural and to the Biddulph, Knutsford, Middlewich, and Winsford Urban District Councils, and late Medical Officer of Health to the Northwich Rural Council.

I HAVE to thank numerous correspondents for information which has been of great value in preparing this paper. Many of them, for very obvious reasons, do not wish their names published, and I have decided therefore to suppress names to a large extent in the course of my story. I intend also, where suitable, to make free use of extracts and quotations from the writings of others, as I wish above all, whilst warmly advocating a principle, to keep myself as much as possible in the background, and to avoid any appearance of merely ventilating a private grievance.

I find that a paper on this subject was read in the State Medicine Section at the meeting of the British Medical Association at Cambridge in 1880, which opened with these words: "An apology from me is due for bringing before this association a matter which has been by discussion rendered almost threadbare." Now, if the matter had arrived at the threadbare stage between 1875 and 1880, what can we say of it in 1899? My vocabulary fails me. Yet the grievance which was then complained of has never been remedied, and it is therefore necessary to keep "pegging away" and to keep travelling over the old ground. If, as is stated, it took thirty-five years' agitation to obtain superannuation for Poor-Law medical officers, we need not despair of eventually getting security of tenure, seeing that we have only been asking for it for about twenty-five years. This is my justification of my choice of subject.

I may also just add that I have not had time to look up and study the various papers which have been from time to time read on this question, but have endeavoured to approach the question entirely afresh, hoping that sincerity and enthusiasm may make up for any lack of either information or ability.

Less than five years have elapsed since I first undertook the duties of a medical officer of health, in happy ignorance of all the trouble and responsibility that were involved thereby. The work appealed to me strongly from the first, and I threw myself heart and soul

* Read before the Incorporated Society of Medical Officers of Health at the Annual Meeting, October 18th, 1899.

into it. It has been my fate to offend a local authority by excess of zeal not tempered with a sufficient amount of discretion, and in consequence I have suffered the loss of a valuable appointment. Hence came the original impetus which drove me from my country obscurity along a path which has finally led me to this meeting of the Incorporated Society. Lest I should be accused of vanity in seeking to give an undue prominence to my personal misfortune, permit me to explain very briefly, but not the less emphatically, that I am here at the request of the responsible Officers of the Society, and as the outcome of a unanimous resolution passed by the North-Western Branch on May 12th last.

Permit me further to say at once that I do not expect, out of my small experience, to be able to tell anything new to my seniors in the public health service, which now numbers many members of a quarter of a century's standing. I can expect to do no more than remind them of facts which have from time to time been within their knowledge, though for the junior members of the society I would dare to venture a modest hope that my recital may be of some value, if only to warn them of dangers ahead.

The North-Western Association of Medical Officers of Health was formed on February 12th, 1875. The opening sentences of the preface to the association's first annual report are these:

"The Public Health Act of 1872, one of the most noteworthy features of which was its provision for the universal appointment of medical officers of health, had the effect of giving to many members of the medical profession new duties and new responsibilities. Town and country practitioners, who had undergone little preparation for such special service, were appointed guardians of the public health, and had to make themselves masters of the laws they were called on to administer. On their industry, tact, and intelligence, and their ability to secure the confidence of their various boards, virtually depended the success or failure of a most important measure of sanitary reform, and it is now matter for congratulation that the medical officers of health proved equal to the task committed to them."

Since then we have had the Public Health Act, 1875, besides a large number of subsidiary or supplemental Acts, and we now have an army of men specially trained in sanitary science. But under these vastly improved conditions I fearlessly claim that medical officers of health to-day are as worthy of eulogium as were their first predecessors in 1875, and that in addition to "industry, tact, and intelligence," many of them perform most important services to the public health for ridiculously inadequate pecuniary rewards, and in face of difficulties caused by interested opposition, which were never dreamed of in 1875, and which even to-day can only be fully understood by those who have actually experienced them.

Can we say as much in praise of the "various boards," now known as councils? It is the object of this paper to show by a number of examples that boards and councils have failed to support their medical officers of health in their struggles for the public good, have even gone further, and punished the medical officers of health for the crime of doing their duty conscientiously by depriving them of office and emoluments. The number of cases now upon record, of which I shall presently give you particulars of a few, constitutes a grave public scandal; and as "Heaven helps those who help themselves," and "the Local Government Board in this matter can't or won't help anybody," it is absolutely necessary that the whole body of medical officers of health should stand shoulder to shoulder, and should relax no efforts until their just demands are conceded.

We have one source of weakness within our own ranks. Some of our members object to combination as savouring too much of trades'-unionism. I will not stop to discuss the broad question—how far the medical profession has benefited either itself or humanity at large by its practice from time immemorial of subordinating its material and pecuniary interests to the fetish of an ideal standard of professional behaviour, though I should not hesitate to hold, to express, and to maintain a very strong personal opinion—but as to the necessity of combination for medical officers of health I am firmly convinced, and I will not be frightened by the bogey of trades'-unionism. You may call the thing by any name you like; it is the thing itself that I want. But if there should be weaker brethren who require moral stiffening, I will just give briefly four reasons for my opinion. Firstly, what about the Medical Defence Union? Had it not to face the same objections at its birth? and has it not lived them down? Has it not demonstrated its value till membership of this or some kindred society is as much a necessity for the general practitioner as life assurance? Is it not trades'-unionism pure and simple? Secondly, what is the general opinion of the profession? Consult the medical press of last August and September on the question known as the Lancashire Colliery Surgeons' Strike. This is open and avowed trades'-unionism. Taking the *Lancet* of August 26th as the mouth-piece of the profession, I find these words:

"We have on more than one occasion urged upon the profession the necessity of supporting one another in this movement and in similar movements, and now that matters have come to a crisis the approval and sympathy of the profession generally should more than ever be extended to the severe measures which the colliery surgeons in one part of England have been compelled to adopt."

And if this is not sufficient, I will, thirdly, quote the opinion of an officer high in a Government department, written to me direct on the occurrence of my own misfortune. He says:

"As regards permanency of tenure, it should be remembered that every Session there is immense pressure from many sources to induce a Minister to bring in a Bill, and those who fail even to take that step have little or no chance."

This I take to be very plain English advice to *combine* to produce the necessary "pressure," for no individual could ever do it. He further continues:

"At the present moment, what with proposed legislation as to tuberculosis, oyster culture, certification of deaths, control of water sources, and half a dozen other things (only two or three of which are now practicable), it needs some definite organization to get a matter put forward for a Bill."

And again:

"The cases have not been few in which deserving and zealous health officers have failed to obtain reappointment at the hands of local authorities, and matters will not be really set right in this respect until medical officers of health make a combined stand in favour of permanency of tenure of office, and demand that this be granted them equally as to Poor-Law medical officers."

Let the bogey of trades'-unionism, then, be laid to rest once for all. But there is a fourth argument still deserving of consideration, namely: the actual condition of the public health service itself. Tabulating the figures given in the Medical Directory for England and Wales (excluding, of course, the Metropolitan districts and a very few entries where the information is not sufficiently full), I get the following results, viz.:

Salary of Medical Officer of Health.	England.	Wales.	Total.
Below £20	70	14	84
£20, but not exceeding £30	463	81	544
Over £30, " £50	330	42	372
" £50, " £100	383	22	405
" £100, " £250	117	8	125
" £250, " £500	55	4	59
Exceeding £500	36	3	39
	1,454	174	1,628

or calculated by percentages:

	Below £20, 5 per cent.
£20, but not exceeding £30, 33½	"
Over £30, " £50, 23	"
" £50, " £100, 25	"
" £100, " £250, 7½	"
" £250, " £500, 3½	"
Exceeding £500, 2½	"

These figures are the more remarkable the more they are examined. Thus, no less than 5 per cent. of all medical officers

of health are permitted by the Local Government Board to hold office on terms as to remuneration which prove the appointments to be mere shams and evasions of the statutory duty of the respective councils. The roll of these authorities I give in an appendix; they deserve to be handed down to posterity. Next, only 2½ per cent. have salaries over £500, and if we add the 3½ per cent. which lie between £250 and £500, we only get 6 per cent. in all of officers who can possibly be "whole-time" officers. These figures have come as a shock to me, and I hope they will not be lost sight of. One-third of the whole number receive salaries of £20 to £30; 56½ per cent., or more than one-half, may be classed as £20 to £50; while 32½ per cent. are £50 to £250 (though only 7½ per cent. of these exceed £100), and no less than 81½ per cent. therefore, which must be allowed to be fairly described as the vast majority, are between £20 and £100. It is on behalf of these officers that justice must be demanded—the bare justice that they shall be protected against vindictive deprivation of office for having been zealous in the discharge of their duties, or for differing in political, religious, or other opinions from the chairmen or members of their committees or councils.

Perhaps this will be the best place to explain that by "Security of Tenure" I mean no more than security during good behaviour, and during the efficient discharge of duties; and also that I am, of course, fully aware (as you all are) that appointments for limited periods, which have so long been the policy, the mistaken policy, of the Local Government Board, are the cause of refusals to re-appoint at the end of the period; and for brevity's sake I shall certainly disallow the technical defence, and speak of them as "dismissals," which to all practical intents and purposes they really are.

It is always well to be acquainted with an opponent's case. Let us see, therefore, what local authorities have to say in their own defence. From a published report of the annual meeting of the Urban District Councils' Association, held on the 19th and 20th July last, I extract the following:

"The conference opened" (on the second day) "with a detailed discussion of the 'Urban District Councils Bill,' a measure to be introduced next Session, for the purpose of amending the law relating to public health, local government . . . etc. . . . A little breeze took place on Clause 17, which provides that 'the clerk, medical officer of health, the surveyor and inspector of nuisances appointed by the council of an urban district not being a borough, shall not be removed from office without the consent of the Local Government Board.' Mr. Crowne (Tottenham) moved the deletion of the clause, and this was seconded by

Mr. A. Grierson (Moss-side). This knotty point had been fully discussed at the previous day's meeting, and apparently there was a general consensus of opinion that Urban Councils ought to retain full control over their officers. *It was agreed to strike out the clause.*"

Here is the whole case in a nutshell, and no comment can make it any stronger. Medical officers of health are to be liable to dismissal if they venture to meddle with any insanitary matters which their councils prefer to let alone. I will just strengthen the case by a quotation from a report published by the Local Government Board itself as lately as July, 1897 :

"The medical officer of health is Dr. —, who has held office since December, 1892. His salary at first was the paltry sum (having regard to the work) of £15 per annum. His remuneration, however, was increased to £30 a year in December, 1895. No portion of this salary is repaid out of county funds. There appears to be a desire among the majority of the members of the Urban Council not to accept repayment of part of this officer's salary, for the reason that they may, as they say, retain to themselves 'full power' to deal with their officer and dismiss him if they think fit. This narrow view of the duties of the District Council is to be regretted, since Dr. — has throughout his tenure of office exhibited a desire to conscientiously discharge his duty . . . in his case there can be little likelihood of the point of incompetence being raised. . . . I regret to learn that his strictures upon the now admitted shortcomings of the Waterworks Company have drawn down upon him the displeasure of certain residents pecuniarily interested in the company, to the damage for the time being of his private practice."

And from another report published by the Local Government Board I give one more extract :

"The attention of the Local Government Board was first specially directed to the condition of the — water-supply by the occurrence of an outbreak of enteric fever in the village in 1887, attributed by Dr. —, the late medical officer of health, to the use of polluted well-water. In subsequent annual reports the same gentleman continued to express an unfavourable opinion regarding the water-supply of the place. In 1891, and again in 1894, professional experts were engaged by the local authority to inquire into the subject. The result of these inquiries confirmed Dr. —'s statements. Nevertheless, no definite steps were taken to provide a better water-supply for —. Dr. —'s action in condemning the wells in the village created considerable feeling against him among the local representatives on the Rural District Council of —, and when the re-election of this officer came up for discussion in December, 1895, he failed to secure re-appointment. Another medical practitioner was elected in his stead. It was openly mentioned in the local press that the rural council had no fault to find with Dr. — as regarded the discharge of his duties during the ten years he had been their medical officer of health, but that his continued insistence upon

the necessity for providing a fresh water-supply for — had given serious offence to the councillors, and that his failure to secure re-election was the punishment meted out to him for his pertinacity."

The only consolation I have found in connection with this disgraceful story is that the new medical officer of health also condemned the water-supply before he had been in office more than a month; but that of course did not recompense his predecessor for his material loss; nor do the Local Government Board appear to have been able to do anything more than print their inspector's report.

The following is from the pen of the editor of a lay paper :

"At times we are seriously inclined to doubt whether sanitary enthusiasts are not overdoing their demands for further powers. This is not because we are sceptical of the value of sanitary legislation, as such, but because there are so many powers already that are not turned to good account. Take the great Act of 1875; is it not a constant and a just cause of complaint that some of its most elementary provisions are ignored by local authorities, or carried out in a perfunctory fashion that serves no useful purpose whatever? Again and again we have shown that councils only appoint a sanitary inspector in order to fulfil the letter of the law, and without the least intention of building up a sound sanitary administration. There are hundreds of authorities who care nothing about an inspector's qualifications so long as they can get his services cheap."

May we not re-echo this statement, substituting "medical officer of health" for "sanitary inspector"? What is the remedy? Security of tenure. It is my belief that security of tenure would so strengthen the hands of the medical officer of health that the Act of 1875 would be administered in so novel a fashion that nobody would recognise it, and no further Sanitary Acts would be required for at least half a generation.

A detail, which has sometimes been magnified into a difficulty, has been propounded to me for my consideration by a well-known pioneer in this agitation. He asked two questions: (1) What do you mean exactly by security of tenure? (2) Where will you draw the line to mark off those to whom it is to apply?

In answer to the first question, I say it is no use asking for anything less than is now enjoyed by the medical officers under the Poor Law; and that is absolutely undisturbed possession of office and emoluments, when once obtained, subject only to dismissal, for approved reason, by the Local Government Board. This proviso is an absolute safeguard of the public interest; and I will not insult your intelligence by stopping to discuss why a Poor Law medical officer should be protected in his care of individuals, whilst his

brother is unprotected in his care of communities. The thing is a monstrous injustice, and not defensible for a moment. In answer to the second question I shall venture to propound an equally definite policy. We must have no dividing line. At first it seems ridiculous to put the five-pound man on the same terms as the one-thousand-pound man. But if anyone will try to draw a line of cleavage practically, he will find himself in such difficulties that I think he will soon be glad to accept my view, even if only as the lesser of two evils. Moreover, we need the active support of every medical officer of health, and it would be folly to exclude even the 5 per cent. forming the lowest class. I will suggest that when the main object is achieved, the proper solution of this question seems to me to lie in giving either the Local Government Board or the county councils an extended power over future appointments. I don't wish to occupy any time to-night in discussing this in detail. The re-organization of the service would be a fit subject for a paper to itself. I merely wish to insist that the question can be taken independently, and therefore is not a vital objection to the solution of the other question which I propound.

I am very far from having exhausted my accumulated stock of extracts from the public press, but in deference to the flight of time I must remorselessly sacrifice the remainder, and pass on at once to consider a few practical instances of injustice wrought by local authorities, and then conclude by a few words of practical application.

CASE I.—Already referred to. Urban District. Population, 7,500. M.O.H. paid £15; afterwards £30. A further advance was refused; and in order to avoid dismissal for having condemned the water-supply, and brought about a Local Government Board inquiry, the M.O.H. resigned (1897). This gentleman's letters to me show that it was actually to his profit to resign an appointment which lost him more private practice than its own value, and at the same time he was fully persuaded that he would have been dismissed had he not preferred to resign.

CASE II.—Already referred to. Rural District. Population, 14,000. M.O.H. paid £40 and dismissed (so stated in Local Government Board's Report) at end of 1895, for advocating new water-supply for a particular township. No further particulars obtained.

CASE III.—Dr. P. Hinckes-Bird, who was appointed under the 1872 Act to a large combination (the Fylde), and had left a London practice to take this office at £500 per annum, found in 1876 that one rural district (the Fylde) seceded from the combina-

tion, because he had pressed for reforms in certain insanitary parishes (especially Marton). The combination broke up owing to the failure of the Local Government Board to keep it together, and he was left stranded, and by 1878 had ceased to be M.O.H. (see *Sanitary Record*, May 1st, 1875, and July 22nd, 1876).

CASE IV.—A precisely similar case (see *Sanitary Record* of May 3rd, June 14th, August 9th and 30th, and September 20th, 1878).

CASE V.—Dr. Syson's case. Believed to be similar in all respects, but exact particulars have not been obtained.

CASE VI.—A precisely similar case (see *Lancet*, July 5th, 1879).

CASE VII.—Yet another similar case. But in this case the M.O.H. secured re-appointment after a contest.

CASE VIII.—This is a similar case, of which I have received very full particulars. The M.O.H. condemned a water-supply in 1874, lost the district concerned, his combination broke up, and he found himself ruined as a M.O.H. I am indebted to this correspondent for references to several contemporary cases. Strong comments on the failure of the Local Government Board to protect this officer may be found in the *Lancet* of July 12th, 1879; in the *Sanitary Record* of July 15th; in the *Medical Times and Gazette* of August 2nd; and in the *British Medical Journal* of September 20th. On October 20th, 1879, the *Sanitary Record* said:

"Dr. Thorne's report corroborates in every respect that made by Dr. — in 1874, but it is difficult to see for what purpose the inspection was made, except to show that, however much a medical officer of health may be in the right, the Local Government Board do not care to defend him against the displeasure of sanitary authorities who quarrel with him for having done his duty."

CASE IX.—Dr. Shirley Murphy's case at St. Pancras some twelve or fourteen years ago, which is too well known to need details.

CASES X. AND XI.—About the same date as the last, two Districts dismissed their M.O.H., but I have no particulars.

CASES XII. AND XIII.—Dr. Martin, of Bolton, and Dr. Marshall, of York.

CASE XIV.—Dr. Grimshaw; exact locality unknown, but case vouched for by a correspondent.

CASE XV.—A municipal borough. Population, 220,000. Salary, £500. M.O.H. refused reappointment at end of five years' service. He desires me to suppress details. He says:

"No prospect of improvement seems to me to exist or be possible without combination and ceaseless agitation."

This gentleman had to revert to general practice, and start *de novo* in middle life, with a family to provide for.

CASE XVI.—This was Dr. Britton, who was M.O.H. of a West Riding combination for many years at £700. His combination broke up by underhand machinations in one contributory district, and at fifty years of age he retired to Harrogate, and “died in a year or two, starved and broken-hearted.” So says my correspondent.

CASE XVII.—The borough of Southend. Population, 16,000. Salary, £250. Dr. Bruce Low reported to the Local Government Board in April, 1896, on the prevalence of infectious diseases. Up to 1884 the salary was £15 15s., afterwards raised to £30. In 1890 it was £25, and four M.O.H. were appointed between 1890 and 1895.

“Locally it was suggested that as each health officer had become unpopular in turn with his authority through pressing forward needed improvements, he as a result failed to secure his re-election.” (Extract from Dr. Bruce Low’s report.)

CASE XVIII.—Dr. Hirst, of Prestwich. Population, 10,485. Salary, £30. Had been connected with the work for twenty years as partner with the M.O.H. Succeeded to the post, but only held it one year, when the usual reasons (not creditable to the authority) led to the usual result. Dr. Hirst read a paper on the subject of “The Conditions of Tenure” before the North-Western Branch of this Society, on July 17th, 1891, which want of space and time alone prevents me from quoting largely.

CASE XIX.—The M.O.H. was appointed to an Urban District, which shortly after was merged into a neighbouring borough. He was almost ruined, being a young man, starting in life, and receiving no compensation for the loss of his office (save a pension of £3 6s. 8d.), without which he was unable to maintain himself where he had settled.

CASE XX.—The M.O.H., after being dismissed, was lucky enough to be succeeded by a man whom the Local Government Board refused to sanction, and eventually got his appointment back.

CASE XXI.—The M.O.H. read a scientific paper before a medical society, and for his opinions on sanitary administration was dismissed by his authority. The Local Government Board here also disallowed the action of the authority, and the post was not lost.

CASE XXII.—This gentleman was dismissed by the Rural Sanitary Authority from post as M.O.H. to punish him for disagreeing with the Board of Guardians as a Poor Law Medical Officer. The most apposite example it is possible to adduce.

CASE XXIII.—After sixteen years’ zealous and valuable service, M.O.H. was dismissed by a Rural District Council for reporting

insanitary conditions; and was rejected by a new Urban Authority which had been enabled to come into being entirely through the improvements he had caused to be carried out in their district.

CASE XXIV.—M.O.H. dismissed by Rural Council on account of friction with an Urban Council (for which he also acted), about a sewage farm of the latter situated in the district of the former.

CASE XXV.—M.O.H. lost his appointment after eight years faithful service on the subdivision of his district under the Local Government Act of 1894.

CASE XXVI.—M.O.H. dismissed for advocating establishment of an isolation hospital. The Local Government Board was appealed to, but no real assistance was forthcoming.

CASE XXVII.—M.O.H. dismissed, after several years’ service, for interfering with the concealment of a case of small-pox in the house of the chairman of his authority. Resolution of sympathy passed by a branch of this Society, March 9th, 1894.

CASES XXVIII. AND XXIX.—Dr. Vacher’s case at Birkenhead in 1890, and Dr. Bond’s case at St. Olave’s, this current year, are too well known to need details.

CASE XXX.—M.O.H. dismissed for political reasons. A bad case.

CASE XXXI.—Another case of politics. The salary at stake £500. M.O.H. reinstated after two years’ interval.

CASE XXXII.—A very bad case, which occurred about eight years ago, through secession from combination.

CASES XXXIII. AND XXXIV.—Two cases of dismissal by a Rural and Urban Council respectively, of which I only know the names.

CASE XXXV.—Finally my own case. When I projected my paper, I thought this would be the centre about which the rest would revolve! But I am now led to appreciate my own insignificance by the testimony which has gone before; and I shall say no more than that I was dismissed by the Northwich Rural Council at the end of 1898 for excess of zeal in advocating isolation hospital provision, improvements in cowsheds, etc. Without occupying space now by quoting from the local press, I will conclude with two sentences from the last letter of the Local Government Board to the Council:

“... The Board failed to understand the grounds on which the Rural District have refused to re-appoint a gentleman who, on their own admission, efficiently performed the prescribed duties of his office.”

“... The Board direct me to point out that the interests of the public health in a district are not likely to be best served if the District Council are ready for no better reason than has been assigned here to remove from office a man who has served them diligently and efficiently.”

And yet the injustice was permitted; and after all their brave words the Local Government Board meekly approved of the appointment of my successor!

Now, a few words only, in conclusion, as to the practical remedy; or rather, as that has been already indicated, the practical means by which it can be attained.

What is our objective? I have already said, Nothing less than statutory protection. This means a Bill to be introduced into Parliament, if possible officially by the President of the Local Government Board as a Government measure. The ease with which the Notification Act, 1899, slipped through was a surprise. Why should not we have equally good luck? Let us therefore take every possible step, neglecting none. Petitions to the Local Government Board there have been by the score, and interviews almost by the dozen. Nevertheless, an interview as soon as possible with the present President is a *sine quâ non*, for his interest and help must be secured. Let a circular be sent at the proper time to every Member of Parliament, backed by personal persuasion of the medical officers of health in his constituency. Meanwhile, the Society should contribute, and contribute generously, to the funds of any other association which is working to the same end, and support the Bill which it is suggested is to be—or is it only may be?—brought in at the instance of the British Medical Association next Session. And if funds are lacking for such work, I suggest that, adopting the plan often made use of in the army and navy, every medical officer of health contribute “one day’s pay” or several days’ pay, according to necessity. This plan has the advantage of taxing all in exactly equal proportion, and surely few would be so blind to the interests of their class as to refuse it.

I have said nothing about superannuation. To my mind, it is not worth discussing until security of tenure is assured. If we can get both, well and good; but if to ask for both is to ask for too much at once, drop superannuation for the time, and concentrate effort upon security of tenure.

In apologizing for the unexpected length to which my remarks have run, I can only say that I have exercised a good deal of compression, and that for every line I have written I have omitted two or more of equal importance. I should be glad to have this borne in mind in the ensuing discussion.

APPENDIX.

LIST OF COUNCILS PAYING LESS THAN £20 PER ANNUM TO THE MEDICAL OFFICER OF HEALTH.

	£	s.	d.
Alford, Lincolnshire (U.)	12	10	0
Bampton, Devon (U.)	10	0	0
Barnard Castle, Durham (R.)	13	0	0
Beaconsfield, Bucks (U.)	10	0	0
Birkenshaw, Yorks (U.)	18	0	0
Bowdon, Cheshire (U.)	15	0	0
Bredwardine, Hereford (R.)	6	0	0
Brierfield, Lancs (U.)	7	10	0
Broadwood Widger, Devon (R.)	15	0	0
Bulkington, Warwickshire (U.)	12	10	0
Calne, Wilts (M.B.)	16	0	0
Camelford, Cornwall (R.)	12	0	0
Catherington, Hants (R.)	10	0	0
Clayton West, Yorks (U.)	11	0	0
Crowle, Lincolnshire (U.)	15	0	0
Dartford, No. 2, Kent (R.)	10	0	0
Darton, Yorks (U.)	15	0	0
Denby, Yorks (U.)	12	0	0
Dodworth, Yorks (U.)	12	12	0
Easton, Northamptonshire (R.)	12	0	0
Eastwood, Notts (U.)	15	0	0
Emley, Yorks (U.)	8	0	0
Eye, Suffolk (M.B.)	10	0	0
Farnborough, Warwickshire (R.)	10	0	0
Farnley Tyas, Yorks (U.)	5	0	0
Farsley, Yorks (U.)	15	0	0
Glemsford, Suffolk (U.)	10	10	0
Glossop Dale, Derby (R.)	15	0	0
Gunthwaite, Yorks (U.)	7	0	0
Hartlepool, Durham (Port)	10	0	0
Harwich, Essex (Port)	15	0	0
Haverhill, Suffolk (U.)	10	0	0
Heage, Derby (U.)	13	0	0
Hedon, Yorks (M.B.)	10	0	0
Horfield, Gloucester (U.)	5	0	0
Hoylandswaine, Yorks (U.)	8	8	0
Hunsworth, Yorks (U.)	10	0	0
Kirkby Lonsdale, Westmoreland (U.)	12	0	0
Kirklington, Yorks (U.)	3	0	0
Little Crosby, Lancs (U.)	6	0	0
Longridge, Lancs (U.)	10	0	0
Looe, Cornwall (U.)	Nil		
Lostwithiel, Cornwall (M.B.)	8	0	0
Ludgvan, Cornwall (U.)	5	0	0
Lyme Regis, Dorset (M.B.)	10	0	0
Maldon, Essex (Port)	10	10	0
Market Rasen, Lincolnshire (U.)	10	10	0
Middleton Cheney, Northants (R.)	13	15	0
Monk Bretton, Yorks (U.)	15	0	0

Dr. J. B. WILKINSON (Oldham) wrote : " I quite agree with it (fixity of tenure). The best work will be done when medical officers are secure from being turned out of office for performing their duty."

Dr. R. DUDFIELD, in moving the resolutions of which he had given notice, said that when he put the subject down for discussion he had no idea that they would discuss the question of security of tenure from the position Mr. Garstang had taken up. His object had been to deal with it as intimately bound up with superannuation. It was requisite that the question should be considered by the Society before December if steps were to be taken to introduce a Bill into Parliament during the next (1900) Session. Practically what he wished to say had already been written in PUBLIC HEALTH.* He desired to introduce to the members of the Society the Bill drafted by the British Medical Association. In the first place, they had to recognise that superannuation for medical officers of health and sanitary inspectors could not be dealt with on the same basis as superannuation for other sections of the local government officers. The nature of the work of sanitary officers was so peculiar, and their interests so distinct from those of other officials, that the former ought to be legislated for as a special class. Mr. Garstang had strengthened the chief argument on which he (Dr. Dudfield) relied, viz., the risk run by medical officers of health of losing their employment. It was hopeless to introduce superannuation for officers who might be dismissed at the caprice of a prejudiced authority. In any proposals for fixity of tenure or superannuation he hoped the Society would include the sanitary inspectors. With regard to the payment of contributions, the Bill introduced in the last few sessions of Parliament by the Superannuation Conference proposed that all contributions should be paid into the current rate account, when they were lost sight of. If contributions were "pooled," a substantial fund would be created, which he thought would be quite sufficient to meet the demands of superannuation each year. He was not quite decided whether it was desirable or necessary to require local authorities to contribute to the superannuation fund. Superannuation was really only deferred pay, and on that argument it appeared right to expect some contribution, but if the contributions were "pooled" there would probably be sufficient to meet all demands, and therefore no necessity to ask the local authorities for any contribution. These principles of fixity of tenure and payment into a central fund instead of the current rate account were the main features of the bill drafted by the British Medical Association. The draft did

* See Editorials of September and October issues.

not include sanitary inspectors, but he thought it should be extended so as to include them. He formally moved:

- (1) That the superannuation of medical officers of health and sanitary inspectors should be dealt with by special legislation, apart from that for other officers of local authorities.
- (2) That any scheme of superannuation of such officers should provide for—
 - (a) Fixity of tenure for such officers, and
 - (b) The payment of all contributions to a common "superannuation fund" in lieu of the current rate accounts of the respective districts served by such officers.
- (3) That the British Medical Association be asked to amend the "Medical Officers of Health Superannuation Act (*sic*), 1899," drafted by them, so as to include sanitary inspectors, and to introduce such (amended) measure in the ensuing Session of Parliament.

Dr. GROVES, in seconding the resolutions, said he was quite sure the British Medical Association would be only too happy to introduce the Bill. The Association were quite prepared to back up the efforts that had been made to secure fixity of tenure, and out of that would come superannuation. He felt sure that if representations were made to the Association urging the inclusion of sanitary inspectors in the Bill the Association would be ready to include them. The Incorporated Society certainly ought to include inspectors in any scheme put forward by the Society.

Dr. WELLESLEY HARRIS said that before entering the Public Health Service he was for some years in the Poor Law Service. In 1896 the Poor Law Officers' Superannuation Act was passed after thirty-five years' agitation and work. Even with the support of the British Medical Association it would be a work of years to secure the passing of a Bill for sanitary officers. He thought they should include all municipal officers in any scheme, and that the best chance of success lay in extending the Superannuation Act of 1896.

Dr. PARKINSON said he was glad to see a change in the opinions of the society on the question of fixity of tenure. He was one of the "half-timers," and it had appeared to some of them that the Society exerted itself more in the interests of whole-timers. He was glad to find they were mistaken. He knew that the Local Government Board was anxious that sanitary officers should have fixity of tenure. He felt sure that the British Medical Association would be quite prepared to support the Society in every way possible, and thought that the best course would be to appoint a small committee to confer with the sub-committee of the British Medical Association dealing with the question of fixity of tenure and superannuation.

Dr. BARWISE agreed with everything Dr. Harris had said—their best plan would be to extend the scheme to all municipal officers. He had never seen their case for security of tenure put stronger than in the paper, and he would like to have it printed at the expense of the Society.

Dr. HOWARD JONES asked whether the British Medical Association were prepared to promote a Bill to include all municipal officers.

Dr. H. BEALE COLLINS said that at a meeting called recently by the Surrey County Council it had been decided to support the Bill promoted by the Municipal Officers' Association, which provided for the superannuation of all municipal officers.

Mr. GARSTANG, in replying, drew attention to the following report of a com-

mittee, presented to the North-Western Branch on September 26th, 1876, and by it approved and adopted:

"The report endorsed the view that tenure of office was at present on a very unsatisfactory footing, for the following reasons: the short period of tenure, the uncertainty of tenure, the mode of election, the possibility of immediate dismissal, and the injury resulting to the cause of public health and sanitary science from the diminished interest taken in the work by medical officers of health through the non-permanency of the office. The sub-committee were of opinion that the appointment of a medical officer of health should, in the first instance, be made as at present by the Local Sanitary Authority, and the medical officer of health should continue to hold his appointment so long as he discharged his duties to the satisfaction of the local authority, and that *under no circumstances* should he be dismissed from office without the sanction of the Local Government Board."

In a petition presented in 1886 to both Mr. Balfour and Mr. Chamberlain, the following paragraph appears:

"They therefore pray your Honourable Board to consider the desirability of requiring better security of tenure of office for medical officers of health, and that you will give effect to the powers conferred on you by Section 191 of the Public Health Act, 1875, with regard to the tenure of office of a medical officer of health, in the same way as you do now in the case of a district medical officer of a union."

The PRESIDENT put the resolutions to the meeting, and declared the same to be carried.

THE PROPHYLAXIS OF TUBERCULOSIS IN NAPLES A CENTURY AGO.—The *Journal d'Hygiène** reproduces a decree put in force in Naples on July 19th, 1782, which is interesting now that so much is being done in a similar direction, although even those who desire most strongly to see notification of phthisis in force would probably not go so far in enforcing the law. The decree runs as follows: "In conformity with the advice of the Supreme Sanitary Council, from this date every medical man having under his care a person suffering from consumption of the lungs must notify the fact immediately on his becoming aware of it, under pain of a fine of 300 ducats for the first infringement, and of banishment for ten years if the offence is repeated. Treatment in hospital of poor patients is compulsory. Their clothing and other effects must be given up, and the most severe penalties will be enforced against those who sell or buy any of their effects unless properly disinfected. An inventory will be made. So much of the clothing, etc., as can be disinfected will be so treated, and the rest destroyed by fire; but after the death of the patient, the authority will replace articles destroyed. Any irregularity will be punished by imprisonment or the galleys. Rooms which patients have occupied will be disinfected; floors, ceilings, and wall-coverings will be renewed; doors and windows will be burned; and the premises may not be re-occupied until the end of a year."

* October 5th, 1899.

THE INEBRIATES ACT, 1898, REGARDED FROM A PUBLIC HEALTH POINT OF VIEW.*

By STCLAIR B. SHADWELL, M.D., D.P.H.,
Late Medical Officer of Health of Walthamstow.

It may appear that in asking you to consider the Inebriates Act, 1898, I am introducing a piece of criminal legislation to your notice which has little or nothing to do with those Acts of Parliament which relate to the public health. It is because the Act of 1898 is limited to a certain criminal class, and therefore falls short of the requirements of an Act which should be for the general good, that I have ventured to introduce it—with a certain amount of trepidation, I confess—as a subject for discussion at this meeting. The medical officer of health, however, makes use of every stepping-stone which will advance him on the road of preventive medicine.

To say that inebriety is a cause of suffering, sickness, and death is but to state a truism. A reference to Table XVI. of the Registrar-General's annual report for 1891 will show that the death-rate from intemperance increased in twenty-five years from 34 to 71 per million persons living. These figures, however, do not give any idea of the actual death-rate from alcoholism, as under the head of intemperance are included deaths only from *chronic alcoholism* and *delirium tremens*, no account being taken of the large number of deaths certified as due to cirrhosis of the liver, ascites, melæna, etc.

We find that in England in 1891 there were registered as dying from

		Males.	Females.
Chronic alcoholism	...	857	643
Delirium tremens...	...	470	85
Cirrhosis of liver	...	2,289	1,552
		3,616	2,280

giving a total of 5,896 deaths from alcoholism; nor have we in these figures included all the victims of inebriety, yet they show a larger number of deaths registered during the same year than from either enteric fever or diphtheria.

In his last annual report (1897) the Registrar-General states: 'To intemperance there were directly attributed during the year 2,397 deaths, viz., 1,460 of males and 937 of females. The male death-rate from intemperance was 97 and the female 59 per million

* Read before the Home Counties Branch of the Incorporated Society, etc., October, 1899.

of living of the respective sexes, both rates being the highest on record."

Moreover, the evil effects of inebriety do not end with the death of the individual. His offspring frequently suffers directly or indirectly from the degenerate conditions produced in the parent by the too free use of alcohol.

In a recent lecture* Dr. Savage says:

"You know that alcoholics are supposed to beget alcoholics. One can go one step further, and say the alcoholic frequently produces degenerate offspring, the degeneracy being more commonly seen along the nervous lines, so that you get, as a result of alcoholism, a tendency to weak-mindedness, to idiocy, and to imbecility; in children you get a tendency to convulsive seizures, to epilepsy with arrest of mental development. There is also a tendency to defect in the higher control, a defective power of adjustment to surroundings, which means in many cases criminality in the offspring of the alcoholic. There is . . . instability, which means in many of these cases the so-called inheritance of a drink tendency."

I do not propose to discuss the influence of heredity upon the drink habit. Most writers on this subject seem to be of opinion that a direct transmission of the taste for alcohol does not occur; but that alcoholism produces degeneration of the nervous system and other tissue changes, and weakens inhibitory power, and that these changes and weaknesses are transmitted from parent to child from generation to generation. Such an example is well furnished in the case of a German woman, Ada Jucke, a noted drunkard of the last century. Out of 834 descendants of this woman no fewer than 709 were proved to be greater or less criminals.

Of all the cases admitted into Duxhurst Inebriate Reformatory 50 per cent. have inebriate parents, and 10 per cent. have insanity in their family. There is one point that should not be lost sight of, viz., that the alcoholic is a strong believer in the necessity of his favourite beverage, and it thus happens that at a very early age his offspring acquires a taste for alcohol.

To what extent English children are given alcoholic drinks I do not know. Recent statistics regarding the habitual use of alcohol by children in a large German city show that 16 per cent. drank no milk, 25 per cent. had never tasted brandy, but had habitually drunk beer or wine, and 8 per cent. had received their daily portion of brandy "to make them strong."

Alcoholic neuritis and cirrhosis of the liver in young children are evidences of the cumulative effect of small doses of the poison long continued. There seems to be very good reason for believing that

* *Clinical Journal*, August 30th, 1899.

there is a marked increase in the amount of alcohol consumed in this country, and that consequently inebriety shows a corresponding advance. Commenting on the last report of the Inland Revenue Commissioners, one of our daily papers makes the following statement:

"The consumption of both beer and spirits has increased very largely during the last few years, and now stands higher per head of the population than in any year of the past decade. Compared with 1895, the amount works out at 3 gallons more beer and one-tenth of a gallon more spirits for every man, woman, and child in these islands. Last year we drank 32 gallons of beer, 1.05 gallons of spirits per head of the population of the United Kingdom."

"As the result of alcoholism, we have a number of well-recognised diseases all of which are preventable. Are we, students of preventive medicine, to stand by and take no heed of the matter?" The philosophy which bids us leave evil alone so that it may cure itself is not one which is acceptable to the medical officer of health. So far legislation has done but little for the prevention and cure of alcoholism.

We have the Habitual Drunkards Acts of 1879 and 1888, by which Justices of the Peace are empowered to grant licenses to persons wishing to keep retreats for habitual drunkards, and the habitual drunkard is permitted to avail himself of the use of such a retreat for a period not exceeding twelve calendar months. There is no attempt in these Acts to regard habitual drunkenness either as a crime or as insanity.

The Inebriates Act, 1898, is a step in the right direction. It recognises the fact that a crime may be the result of a psychological condition produced by chronic alcoholism, and therefore a disease, and, secondly, that chronic alcoholism under certain circumstances, though a crime, requires a special form of treatment.

Thus, under Section I. (1), when a person is convicted on indictment of an offence punishable with imprisonment or penal servitude, if the Court is satisfied that the offence was committed under the influence of drink, or that drunkenness was a contributing cause of the offence, and the offender admits that he is, or is found by the jury to be, a habitual drunkard, the Court may, in addition to or in substitution for any other sentence, order that he be detained for a term not exceeding three years in any State inebriate reformatory or in any certified inebriate reformatory.

Section II. (1) provides that any person who commits any offences mentioned in the first schedule to this Act, who within twelve months preceding the date of the commission of the offence has been convicted summarily at least three times of any offences so mentioned,

and is a habitual drunkard, shall be liable . . . to be detained for a term not exceeding three years in any certified inebriate reformatory. The offences mentioned in the first schedule are all in connection with drunkenness, such as being found drunk in a highway, or other public place, being guilty while drunk of riotous or disorderly behaviour in a highway or other public place.

Section III. empowers the Secretary of State to establish "State inebriate reformatories."

Section V. provides for establishment of reformatories by county or borough councils.

Section IX. (1) the councils of any county or borough may contribute towards the establishment of a certified reformatory, or may defray the whole or any part of the expenses of detention of any person in any certified reformatory, and two or more councils may combine to establish or maintain a reformatory certified under the Act.

This Act amends the Habitual Drunkards Act, 1879, and substitutes a term not exceeding two years for that of twelve months, during which a voluntary applicant may be detained in an inebriates' reformatory. It will be seen that, so far as compulsory powers are concerned, the Act deals with one class of inebriates only, viz., a class consisting of inebriates who fall into the hands of the police.

Before considering the question as to whether it is advisable to extend the Act with the view of including within its scope the non-criminal inebriate, let us ask whether the treatment of inebriety has been sufficiently successful to warrant such an extension.

I will not detain you long on this point, beyond stating that the medical officer of the Industrial Farm Colony, Duxhurst, has kindly supplied me with much interesting information on this point, showing that the result to a great extent depends on the length of time the patient is under treatment. The period should not be less than one year, and in some cases should be from two to three years.

Forty-five per cent. of cases under treatment have relapsed; but of the cases that stayed at least one year 33 per cent. only have relapsed. The improvement both in body and mind is most marked: the patient's weight increases, and his mind regains its normal condition. The effects of treatment have been so far encouraging as to justify the opinion that with greater powers and greater facilities the result will be eminently satisfactory. Let us recognise fully the fact that inebriety is the cause of disease and degenerations far-reaching in their effect, and that the victims sooner or later lose their higher powers of control and sink into a mental condition which is nothing more or less than insanity. Having recognised

this important fact, we are in a position to consider the advisability of the Inebriates Act being so extended as to provide for the compulsory treatment of the habitual drunkard, be he rich or poor.

I admit the question is a very difficult one, and much has been said about the "liberty of the subject," but when the subject is no longer under control, mental or moral, he surely forfeits his liberty and requires the protection of the law. No man has any right to select for himself the disease which is to kill him, much less has he any right to kill himself by a slow yet sure poison, even though he may object to some of our modern diseases, and feel that :

" Better old complaints should kill us,
So we might not end our term
Victim to the new bacillus
And the liliputian germ."

The late President of our Society (Dr. Gwynn), in his address, impressed upon us that the medical officer of health should be a public teacher. I think that our annual reports might be more fully used for instructing the public on the evil effects of alcoholism. I am fully of the opinion that the time has arrived for our Society to take an active part in assisting Parliament in framing an Act to deal with the compulsory treatment of inebriates.

DISCUSSION.

The PRESIDENT remarked that the deaths of persons of the better classes were never certified as due to alcoholism, but usually cirrhosis of the liver, and that the certificates were therefore to a certain extent misleading.

Dr. SKINNER doubted whether any benefit was derived from the various Habitual Drunkards Acts, and considered that the causes of drunkenness should be dealt with. The facilities for obtaining drink were too great, and the number of public-houses should be controlled.

Dr. MORISON thought that the temperance question had not been raised, and was outside the scope of the paper. He had known drunkenness in the better class of society, and many instances where families had been ruined. The Legislature should be urged to pass a measure to bring the dipsomaniac under control.

Dr. THRESH considered that it was well to be reminded that the medical officer of health had to do with other diseases than those of the infectious class, and that he had to do more with the prevention than with the cure of disease. Inebriates who brought ruin on themselves and their families should be placed under proper restraint. He did not think County Councils were going to take the matter up very enthusiastically, and form large institutions in which the public would have confidence. The Act was too recent to be able to form an opinion as to how it would work, or to suggest any extension or alteration of it.

Dr. WOODFORDE thought the matter should be regarded from both points of view, viz., prevention and treatment.

Enteric Fever.

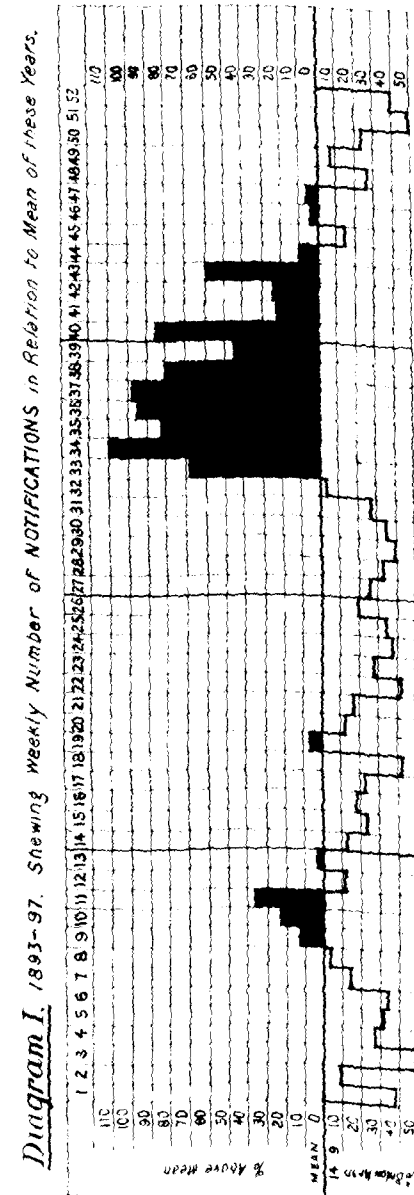


Diagram II 1885-88. Showing Weekly Number of NOTIFICATIONS in Relation to Mean of Year.

ENTERIC FEVER AND DIARRHŒA IN GLASGOW.*

By A. K. CHALMERS, M.D.,
Medical Officer of Health of Glasgow.

ENTERIC FEVER.

DURING 1898 1,212 cases were registered and 228 deaths occurred, giving a case mortality of 18·8 per cent. and a death-rate per 1,000 living of 0·308 for the year. Of these cases 87 per cent. were treated in hospital, and 86 per cent. of the deaths occurred there.

Since 1884, when the death-rate from this disease was 0·388 per 1,000, the rate for 1898 has not been reached, and considerable importance, therefore, attaches to the following table:

Enteric Fever—Death-rate per 1,000 living.

Mean of 10 years, 1881-90	...	...	= 0·255 per 1,000 living.
" 5 years, 1886-90	...	...	= 0·185 " "
1891	...	...	= 0·256
1892	...	...	= 0·155
1893	...	...	= 0·180
1894	...	...	= 0·218
1895	...	...	= 0·174
1896	...	...	= 0·197
1897	...	...	= 0·241
1898	...	...	= 0·308

The lowest series of death-rates from enteric fever hitherto recorded in Glasgow occurred in the years 1885-88, and since then the average death-rate for these years (0·170 per 1,000) has been exceeded in every year but one, viz., 1892. Each district presenting an increase in the enteric fever death-rate of 1891-97 had also an increase in diarrhoeal death-rate for the corresponding years. This is an association which suggests the operation of local influences rather than the introduction of those of a distinctly epidemic character, and the suggestion is strengthened by what we know of the circumstances attending the prevalence of this disease in 1898.

During the autumn months five groups of cases occurred which illustrated both forms of association, and in three instances the association was of an unmistakably epidemic character. The first in order of occurrence consisted of 24 cases scattered over the city, but all having a history which referred the period of infection to a holiday residence at a seaside resort on the river Clyde. Later,

* From Annual Report for 1898.

in the western district of the city, 51 cases occurred which were traceable to milk infection, resulting from an illness occurring in the family of a dairy employé, and not recognised at the time to be enteric fever. Still later, 24 cases occurred among the inmates of the Abercromby Street Industrial Schools, also resulting from unrecognised illness occurring previously. In addition, there were three groups of cases where the association was a distinctly local one, due, that is, to local causes, and well illustrated in one instance by the combined presence of faulty sewerage and a wet ashpit. But all these together only account for 140 cases, and the remaining cases fall to be regarded as an exaggeration of the chronic prevalence of the disease resulting from the local conditions which the exceptional climatic conditions present in the autumn months of the year rendered peculiarly active. This will be made clear by a comparison of the monthly variations in the prevalence of the disease during the year 1898 and several preceding years.

In the following table the notifications are stated per 100,000 of the population given as a yearly rate calculated on the average daily number of notifications for the several months:

	Year.	Jan.	Feb.	Mar.	April.	May.	June.
1890-97	...	114	92	100	116	86	85
1898	...	166	69	103	98	78	108
							80
	Year.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1890-97	...	114	69	166	208	176	118
1898	...	166	85	225	246	402	338
							151

These figures are to be read by comparing the monthly number of cases with that given for the year.

As an average for eight years the figures for 1890-97 will fairly represent the normal seasonal variation of enteric fever in Glasgow, and they show that the prevalence increases from January to March, then falls to its point of lowest prevalence for the year in July, from which a rapid ascent is begun, which reaches its maximum in September, while December marks the lowest prevalence for the winter months. Comparing 1898 with this, the March prevalence is exceeded by an increase occurring in February and May, so that the usual decrease of the second quarter of the year does not occur, and while the autumnal rise had already begun in July, its maximum was not reached till October. But in the main the increased prevalence resulted from an extension of the autumn rise, and its prolongation beyond the usual period, as will be more apparent if the rates are restated in quarterly periods:

	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
1890-97	...	103	...	82
1898	...	90	...	89
			...	148
			...	185
				125
				297

This apparent tendency towards the maintenance of a mean level of prevalence during the first two quarters is suggestive of the operation of some constant factor, the value of which can best be estimated by contrasting the weekly variations with the mean weekly prevalence for the year. For this purpose Diagrams I. and II. have been prepared to show this for the years 1893-97 and 1898. These are constructed on the weekly number of notifications, and according to Diagram I., which illustrates the average experience of five years, the spring prevalence begins definitely in the 7th week, and reaches its maximum in the 9th, and, with slight exceptions, occurring in the 13th and 19th weeks, the mean weekly prevalence is not again exceeded till the 33rd week. The maximum prevalence is reached in the 34th week, when it exceeds the mean by 110 per cent., and by the 47th the weekly excess for the year is over. If each of these weekly readings is displaced about four weeks backward, so that time is allowed for the incubation of the disease and the development of symptoms, we may read off directly the period when infection occurs. Thus, the notifications received in the 34th week of the year will represent infection contracted in the 30th week—that is, during the last week of July.

In contrast with this, Diagram II. shows that in 1898 the weekly average prevalence of the disease for the year was not exceeded till the 32nd week. This does not arise from lessened prevalence of the disease in the first six months, but because the autumn increase raised the weekly average of cases for the year to 23.6 against 13.9 for the years 1893-97. Already in the 7th week the normal tendency of the disease to become more active had resulted in the average weekly prevalence for the year being reached, and in many weeks of the second quarter the disease displayed a considerable departure from the course of its usual prevalence.

This will be more clearly seen if we examine a chart of the weekly notifications constructed on the weekly mean of the years 1893-97, so that they may be compared with the first twenty-six weeks of Diagram I.

Now, we find that the cases in the 7th week form a considerable elevation, consisting, when individually examined, of cases in no way associated with each other, and in the second quarter of the year a series of weekly excesses was being established which formed, as it were, a prelude to the wide departure from the normal prevalence which took place in autumn.

The autumnal excess begins a week earlier, and is maintained in an irregular way till the 49th week. The actual maximum is only reached in the 40th week; but when the proportion due to recog-

nised epidemics is excluded, the 39th week has an equal excess. The proportion contributed by the epidemic cases to the weekly excesses is indicated by a lighter shading of the columns; were their effect entirely removed, the mean weekly number would be reduced by 2·7.

It will be convenient here shortly to state the contrast which 1898 presented when compared with the earlier years of the decade in respect of mean temperature and rainfall.

Mean Temperature.

	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
1890-97 ...	39·7°	51·7°	57·2°	42·9°
1898 ...	42·0°	51·3°	58·3°	46·5°

A higher mean temperature characterized the first, third, and fourth quarters of the year, and the *minus* difference in the second quarter is insignificant.

Rainfall in Inches.

Year.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
1890-97 ...	38·05	8·28	10·74	11·32
1898 ...	38·55	7·24	10·36	14·84

Combined with a higher mean temperature, 1898 had a smaller rainfall in the first, second, and third quarters of the year. These cannot of themselves be regarded in any sense as direct causes of disease, but they supply two of the essential conditions—heat and moisture—on which organic life depends. The first considerable fall of rain was delayed till November, and we have already seen that the first considerable decline in the notifications occurred in December. The sequence of events is striking, and repeats a lesson already frequently insisted upon. The chronic prevalence of diarrhoea and enteric fever means surface pollution. A heavy rainfall removes this, and its action can be fairly imitated by artificial means.

Of the twenty-four districts of Old Glasgow, twelve had a higher rate from enteric fever in 1891-97 than in 1881-90; six* of those twelve had a still higher rate in 1898, and of the sixteen districts with a higher death-rate from enteric fever in 1898 than in 1891-97, fourteen are within the old area. That is, with the exception of Govanhill and Maryhill, the increase in 1898 has been confined to certain districts within the area of Old Glasgow.

Of the six districts which have a continuously increasing death-

* These are 4 (St. Rollox); 6 (High Street and Closes, E.); 7 (Greenhead and London Road); 10 (St. Andrew's Square); 13 (Brownfield); 16 (Cowcaddens).

rate from enteric fever in the three periods, three of them (16, 13, and 6) occupy respectively the second, third, and fourth places in the grading of the districts with high death-rates from all causes, and we may endeavour to ascertain what they have in common with St. Rollox (4), Greenhead and London Road (7), and St. Andrew's Square (10), in which the general death-rates are much nearer the average for the city.

TABLE I.

Districts with Death-rate from Enteric Fever increasing in 1891-97 and 1898, as compared with 1881-90—Death-rates stated per Million living.

Districts.	Period.	All Causes.	Enteric Fever.	Diarrhoea.	Phthisis.	Acute diseases of Lungs.	Birth-rate.	Infant Mortality per 1,000 Births.
16. Cowcaddens ...	1881-90	32,550	160	1,110	3,350	8,370	42·8	190
	1891-97	32,773	295	1,447	2,688	8,823	43·9	215
13. Brownfield ...	1881-90	30,370	210	990	3,340	7,820	37·1	199
	1891-97	31,326	251	1,129	2,259	7,988	40·6	183
6. High Street and Closes, E. ...	1881-90	33,590	130	860	4,290	9,020	36·4	191
	1891-97	31,197	326	979	2,938	9,024	38·8	193
4. St. Rollox ...	1881-90	22,650	160	550	2,660	5,050	39·4	138
	1891-97	21,682	163	427	2,039	4,639	36·9	144
7. Greenhead and London Road ...	1881-90	24,910	260	890	3,000	5,180	40·9	149
	1891-97	23,296	271	1,293	2,195	5,063	40·2	150
10. St. Andrew's Square	1881-90	24,490	160	620	2,790	6,490	30·8	149
	1891-97	25,611	178	1,035	2,675	6,956	31·9	173

In three of these the death-rates from all causes increased, in five an increase in the diarrhoeal occurred, and in five also there was an increased infantile mortality. All had a lower death-rate from phthisis, while acute lung diseases increased in four.

For comparison with other towns the following tables are given :

TABLE II.

Death-rate per 100,000 from Enteric Fever and Diarrhoea in the Principal Towns of Scotland for the Seven Years 1891-97 and for 1898.*

	Enteric Fever.		Diarrhoea.	
	1891-97.	1898.	1891-97.	1898.
Glasgow ...	20	31	56	71
Edinburgh ...	15	10	35	56
Dundee ...	17	5	78	94
Aberdeen ...	9	10	44	55
Leith... ..	13	11	42	79
Paisley ...	31	54	53	94
Greenock ...	12	35	72	98

* Detailed Reports, 1891-96; Annual Summaries, 1897-98.

TABLE III.
Death-rate per 100,000 from Fever and Diarrhoea in certain English Towns for the Ten Years 1888-97 and for 1898.*

	Fever.		Diarrhoea.	
	1888-97.	1898.	1888-97.	1898.
London ...	15	13	67	97
Liverpool ...	35	26	117	154
Manchester ...	26	23	110	184
Birmingham ...	16	22	111	136
Leeds... ..	22	22	110	122
Sheffield ...	23	40	121	189

DIARRHOEA.

It will be convenient here to deal with this class of diseases according to two different methods of classification, using the Registrar-General's figures for a comparison of the city rate over several years, and adopting the local method of classification when contrasting the death-rate of the several city districts. The former is the method most widely in use, and the rate thus given is comparable with that for other towns; but it leaves out several forms of the disease which, by local custom, have been included in the district diarrhoeal rates in Glasgow for many years.

In the following table the deaths and death-rates *per million* for each year since 1894 are given, with the observation that the figures for the years 1897-98 are subject to revision, the Registrar-General's detailed annual reports for these years not being yet forthcoming.

TABLE IV.
Glasgow: Diarrhoeal Diseases—Deaths and Death-rates per Million at Certain Ages.†

Year.	DEATHS.				DEATH-RATE PER MILLION.			
	Under 1 year.	1 and under 5 years.	5 years and upwards.	All ages.	Under 5 years.	5 years and upwards.	All ages.	Death-rate under 1 year per 10,000 born.
1894	126	52	63	241	2,044	105	351	56
1895	225	114	109	478	4,181	179	687	112
1896	188	89	59	336	3,098	96	477	78
1897	—	402	67	469	4,434	107	656	—
1898	—	415	92	507	4,518	145	700	—

But as the movement of a death-rate can with greater accuracy be gauged by comparing groups of years, the average death-rate is

* Registrar-General's Annual Summary for 1898.

† In this and other tables it must be noted that the rates for the whole city are calculated on the Registrar-General's deaths and population; wherever district comparisons are instituted, the corrected deaths and the medical officer's estimate of the population are used.

given in the following table for several periods at all ages, and also at ages under and, again, over five years.

Glasgow: Diarrhoeal Death-rate per Million.

		Under five years.	Five years and over.	All ages.
Five years (1886-90)	...	2,985	126	493
" (1891-95)	...	3,313	139	543
1896	...	3,098	96	477
1897	...	4,434	107	656
1898	...	4,518	145	700

If, now, we compare the death-rate of the several age-groups in 1896-98 with the corresponding rates in the closing years of last decade, we have the following contrast:

Diarrhoeal Death-rate per Million.

All ages (1886-90)	=	493
" (1896-98)	=	611
Difference	...	118 = an increase of 24 per cent. in 1896-98.
Ages 0-5 (1886-90)	=	2,985
" (1896-98)	=	4,017
Difference	...	1,032 = an increase of 35 per cent. in 1896-98.
Ages 5 and upwards (1886-90)	=	126
" (1896-98)	=	116
Decrease	...	10

In the periods thus compared the death-rate at ages over five shows a decrease. In the years 1891-95, however, it was greater by 10 per cent., and in 1898 by 15 per cent., than in 1886-90; but in these years the deaths under five years increased by 11 per cent. and 51 per cent. respectively, so that practically the increase in the diarrhoeal rate at all ages, when a series of years is compared, is due almost wholly to an increase in the number of deaths among children.

It was observed, in dealing with enteric fever, that five of the six districts which had an increasing death-rate from that disease in 1891-97 and in 1898 showed also an increase in the diarrhoeal rate, and when 1891-97 is compared with 1881-90, only three districts had a lower diarrhoeal death-rate in the 1891-97 period, and District 14 alone a still lower rate in 1898. This district, together with District 10 (St. Andrew's Square), are the only two districts with a lower rate in 1898 than the average of the ten years 1881-90; but in the average of the years 1891-97 the rate for the latter district is much in excess of that for the decade 1881-90.

THE PREVENTION OF PLAGUE THROUGH THE SUPPRESSION OF RATS AND MICE.*

By DR. DORIGA,

Provincial Medical Officer of Health, Venice.

In the recent outbreaks of plague in China and India it has been noticed that mice have played a very important part in the diffusion of the disease. This fact was for the first time brought before the attention of Europeans in 1881 by the French missionaries of Yunnan, and by Rocher, French Consul at Mong-Tze; but it appears to have been long known and dreaded by the natives of the Himalayan districts, where plague is endemic, as also by those of Formosa (Ogata); and Hankin found it indicated in the memoirs of Ichangir-Schangir, Emperor of India, in reference to the pest at Agra in 1618.

Although Simond in 1893, at Long-Tcheou, on the Kwang-Si, Rennie at Pakkoï, and Lien-Chu in the province of Canton, and Hutchinson in the district of Gurhwal in 1894 had confirmed the foregoing observations, the merit of having affirmed that plague before becoming a disease of men is a disease of rats, and of having advocated the destruction of these animals as a valuable prophylactic measure against the epidemic, is undoubtedly due to Yersin.† The careful researches of Snowet Weir, first Municipal Commissioner and Second Sanitary Officer of the City of Bombay, and the minute investigations of Simond; and Hankin§ have proved the accuracy of these opinions, and have set them forth in fresh light.

Hence the agency of mice in spreading plague, and the relation of their disease to that of man as cause and effect, may be considered as amply proved.

The following is a brief résumé of the chief facts relating thereto as ascertained by recent investigations:

1. Kitasato and Yersin, and many others after them, have found the specific bacillus of plague in the dead bodies of rats and mice collected in houses in which cases of the disease subsequently broke out among the occupants, or in the streets of infected towns. They have also placed beyond question the great susceptibility of these rodents to the bacillus.

* Translated from the *Revue d'Hygiène* of August, 1899, by H. E. A.

† 'Sur la Peste Bubonique,' *Annales de l'Institut Pasteur*, January, 1897.

‡ 'La Propagation de la Peste,' *Annales de l'Institut Pasteur*, October, 1898.

§ *Ibid.*, November, 1898.

2. In all the towns of India manifest examples of contagion from mice to men have been observed. At Bombay, in certain establishments where the dead bodies of rats were found, it has been noticed that the persons who collected them alone contracted plague, although many other workpeople were engaged at the same place.

3. The first cases of the disease have sometimes appeared in warehouses where wheat, cotton seed, or other substances likely to attract rats were stored. At Kurachee, where the warehouses are situated in streets without dwelling-houses, the first sufferers were the caretakers.

4. Well-constructed and well-maintained houses, *i.e.*, where rats cannot find harbour, nearly always remain free from plague. This same immunity was demonstrated by Rennie at Canton in 1894 among the occupants of boats anchored in the river. On the other hand is to be observed the permanence of infection in the houses of poor natives, notwithstanding the removal of the residents and furniture and the most rigorous disinfection, because of re-infection by means of mice.

5. The epidemics at Bombay, Kurachee and Karad were chiefly localized in quarters where the disease had broken out amongst rats. The spread of infection in other parts of these same towns was regularly preceded by the immigration and death of rats, and its diffusion always corresponded to the route of travel taken by these rodents in their migrations.

6. In healthy countries adjoining infected the disease broke out amongst the inhabitants without the importation of a single (human) case, but was preceded by the immigration of rats from an infected place.

7. In many countries and towns the development of the epidemic among the inhabitants followed a month after the importation of the first cases, or after the death of fugitives arriving from infected localities. During the interval the plague had been propagated by mice.

8. Lastly, the mode of infection and propagation of plague on certain ships proved that the rats on board had been the vehicles of contagion.

An evident and well-demonstrated connection exists between the plague of man and that of mice. The same specific agent is the cause of each. It is communicable from mouse to man, and *vice versa*. Either one or the other may be the vehicle of contagion from place to place. Although the transference of infection from a sick man to a healthy man does occasionally occur, the mouse (or

rat) seems to be the chief and almost necessary agent of the epidemic diffusion of plague.

These observations show how ordinary measures, viz., isolation of the sick and disinfection, which give excellent results in other infectious diseases, are ineffectual against plague unless all mice and rats are promptly exterminated, or their migrations kept within a circumscribed zone. In Bombay and certain other Indian towns, attempts have been made since June, 1898, to secure this result, either by flooding the sewers with carbolic acid, sprinkling the earth round dwellings with carbolic powder to keep out the rats, or inoculating a few of them with the bacillus of septicæmia to spread an epizootic amongst the rest. But the results have not been encouraging. It is clear, however, that suitable precautions must be adopted, and occasion taken to ascertain if there is any rapid, sure, and practicable way of destroying rats and mice.

The hunting of these rodents by their natural enemies, such as cats, dogs and pigs,* is a very ancient custom, but their employment during times of plague is not free from danger. Observed facts and laboratory experiments conduce to the belief that dogs only are immune, and that cats and pigs are tolerably susceptible.

The experiments of Lawson, who failed to infect pigs, either subcutaneously or by the mouth, are contradicted by the positive results of Wilm† and of Ogata.‡ The latter has seen cats die after inoculation, like other animals, only a little more slowly. Merely a contradiction in appearance to this are the more recent experiments of Mattei,§ who did not succeed in killing pigs and cats, but observed them to be more or less gravely ill, and found plague bacilli in their dejecta.

Although these animals may become vehicles of infection either through their dejecta, or by their feet and snouts becoming soiled with infective fæces, blood, etc., or, in the case of cats, from their custom of clawing, in certain cases they may be useful in driving away vermin, and so preventing an epidemic. Professor Muller, quoting Hankin, relates that in the village of Mahim-Bundarwada at least one cat was kept in every house by the residents, to kill

* In some places both owls and screech-owls are used for the purpose, being kept in the cellar during the day, and at night brought up into the rooms.

† Wilm., 'Sur l'Épidémie de la Peste à Hong Kong en 1896,' *Hygienische Rundschau*, 1897, No. 5 et 8.

‡ Ogata, 'Sur l'Épidémie de Peste à Formose,' *Centralblatt für Bakteriologie*, vol. xxi., 1897, p. 769.

§ Dr. Mattei, 'Sur la Transmission de la Peste Bubonique aux Animaux,' *Congrès d'Hygiène à Turin*, 1 Octobre, 1898; 'Souris et Chats dans la Diffusion de la Peste,' *Académie Gicenia de Catane*, 18 Novembre, 1898.

mice, which were at that time considered capable of conveying the plague, and that this village remained free from the epidemic although it raged in a great many neighbouring villages.

In sewered towns, or those affording other shelter for rats and mice, the above means of defence seems inadequate; and when the malady has already affected the rodents it will be well to send from the house every animal likely to be brought into contact with them, and resort to physical, chemical, or mechanical measures of destruction, either singly, or in combination, according to circumstances of time and place. Rats may be suffocated by blowing smoke or sulphur fumes down their runs, with special apparatus, such as gas-guns or smoke-machines, consisting essentially of an ordinary bellows fitted with a long tube, having an expansion to hold rags charged with sulphur for burning. In Thessaly the best results followed the burning of sulphide of carbon in the runs after closing all the holes.

Among poisons, those chiefly used are arsenic, phosphorus and strychnine, mixed with other substances; carbonate of baryta, camphor, chloride of lime and scilla maritima, mixed with various foods, especially flour.

These and other similar measures can yield only limited and unsatisfactory results, especially in inhabited dwellings having underground kitchens, with sinks, drains, and other channels, inaccessible to man, but harbouring rats. Asphyxiating processes are nevertheless well worth a trial when the inlets to such conduits can be hermetically closed.

In addition to the foregoing means, which necessitate action of a somewhat individual character, experiments have in recent years been made specially against field-mice, with the object of destroying rapidly the entire population of mice in a given area, which consist in provoking among them the development of an epizootic. This idea was put into practice for the first time in 1882 by Dr. G. Joseph,* Professor in the Scientific Institute of Rural Economy at Breslau, who covered the skins of mice for several days with rags soaked in the secretions and crusts of human *tinea favosa*, and then set them at liberty. The sick mice succumbed to a severe disorder, and were destroyed by healthy mice, which are in the habit of killing and eating their feeble, sick, or disfigured companions, and the malady was thus spread among the multitudes of mice in the locality. The weak point is the duration of the disease, which, lasting several weeks, cannot successfully prevent the invasion of another ailment of more rapid course, like plague.

* Joseph, *Der Landwirth*, 1882.

Besides, the contagiousness of favus seems very limited, as in many towns it is not uncommon to find rats ill of this disease, in spite of which the multiplication of the species is not limited. Lastly, even though the ifomycetes proposed by Joseph were more successful, it could not be generally adopted, as the malady is communicable to man.

A better known micro-organism is that suggested by Löffler,* which was isolated from white mice, dead of an epizootic of spontaneous origin in the laboratory in October, 1890. This is a very motile bacillus, capable of forming long filaments, and not stained by Gram's method, which, from its resemblance to Eberth's typhoid bacillus, has been named the typhoid bacillus of mice (*B. typhi murium*). Löffler has observed that not only white mice but also the *Arvicola arvalis* can be infected by way of the alimentary canal. Death supervenes in fourteen days. Other rodents, such as the field-rat (*Mus agrarius*), and a black rat with striped back, as also cats and many animals useful in agriculture, e.g., pigeons, fowls, goats, sheep, pigs, and small singing-birds, resist infection. By the decree of the King of Greece, Löffler, in 1892, carried out his experiment on a large scale in Thessaly against the *Arvicola savii* (a large mouse almost like a rat), and obtained excellent results.

However, an English Commission sent soon afterwards into Thessaly to collect information on this matter arrived at the conclusion that the method was not available on account of its costliness, but still more because the bacillus destroyed the *Arvicole* only, and had no effect on other mice. Further, it is not sufficiently proved that the disease spreads among mice left at liberty. Moreover, Professor Lüpke, of Stuttgart, questions the efficacy of the method, as in his laboratory experiments he noticed that only the more feeble individuals died after a period of less than fifteen days, whilst the stronger, escaped with a slight reaction, or were not even unwell.

The conclusions of Sniadowski,† Straünsch,‡ Lunkevitch,§ Mereshkowsky,|| and several others who have studied the *Bacillus*

* Löffler, 'Sur les Épidémies observées sur les Souris à l'Institut d'Hygiène de Greifswald,' etc., *Cent. f. Bakt.*, 1892, xi., p. 129; *ibid.*, xiii., p. 1; *ibid.*, 1893, xii., p. 647.

† Sniadowski, quoted by Zupnik, *Cent. f. Bakt.*, 1897, xxi.

‡ Straünsch, *Der Landwirth*, 1892, 79.

§ Lunkevitch, 'Recherches sur la Biologie du Bacillus Typhi Murium,' etc., *Cent. f. Bakt.*, xv., p. 845.

|| Mereshkowsky, 'Contrib. à l'Étude de la Virulence du Bacillus Typhi Murium,' etc., *Cent. f. Bakt.*, 1894, xvi., p. 612.

typhi murium in the laboratory, are similar to those of Löffler. The experiments of Sniadowski were few in number and superficially conducted. Straünsch noted a delay in the death of mice, especially of the house variety, and Lunkevitch concludes that the bacillus is surely and promptly fatal to the *Arvicole* in five or six days, but that the house-mice are immune, or, if infected by eating field-mice, will not die until much later, even the forty-seventh day. Mereshkowsky affirms that the domestic mouse is susceptible to the action of the bacillus, but that death occurs at a period much later than stated by Löffler, even so remote as two months.

Among those who have tried this method in the country, Kornauth* alone relates that in Austria of thirty-six stations of agricultural chemistry the results have been very good at thirty, fairly good at three, and negative at three; and concludes that the action of Löffler's bacillus as a means of destroying mice is certainly affirmed. All other experimenters have had very little satisfaction in their results.

Lastly, Zupnik,† of the University of Prague, inquired into the matter of the virulence of Löffler's bacillus, chiefly with the object of establishing the reasons for the difference of the results obtained in the laboratory and in the country. From numerous well-conducted experiments he concludes that the *Arvicola arvalis* and the *Mus agrarius*, like the white and the gray mouse, are killed in a mean period of fifteen days. But as the bacillus does not produce toxines, or at least since its products are not toxic to mice, death is due to the invasion of the blood and organs by the bacilli; so that the quantity of bacilli ingested is of great importance, both as regards the duration of the disease and its consequences. If the cultures are poor the mice remain healthy. Zupnik has further noticed that in leaving the cages of sick and healthy mice together for several weeks the latter were rarely infected. This explains why a great many of the experiments made in the country were without effect. In the laboratory undiluted cultures are most commonly used; and, moreover, the mice are obliged to consume infected food only. On the contrary, in the country, on account of the expense, the cultures are diluted and the mice do not eat up all the food except where there is nothing else for them. Still, they may be infected by devouring the corpses of their defunct

* 'La Destruction de la Peste des Souris au moyen du B. Typhi Murium,' *Cent. f. Bakt.*, 1894, xvi., p. 104.

† 'Sur la Mode de l'Emploie Pratique des B. des Souris, apropos du B. Typhi Murium de Löffler,' *Cent. f. Bakt.*, 1897, xxi., p. 446.

companions, although these are apt to be quickly seized by birds of prey.* Whilst observing these causes of failure Zupnik tried the method in the fields of Galicia with favourable results.

(To be continued.)

THE EFFECT OF THE ADDITION OF SALT TO CARBOLIC ACID.—Scheurlen and Bechman a few years ago published† the results of experiments indicating that the germicidal action of carbolic acid was increased by the addition of sodium chloride. One per cent. carbolic acid with 24 per cent. common salt gave better results than a 6 per cent. solution of carbolic in plain water. The same result was obtained with orthocresol. Scheurlen and Bechman were of opinion that the salt took up some of the water, thus making the solution of carbolic acid stronger. Römer, of the Institute of Hygiene of the University of Monaco, has recently repeated and confirmed these experiments, but suggests another and more feasible explanation of the action of the salt. Having in mind the fact that micro-organisms contain substances analogous to serum albumen, he made experiments on the lines of those of Bucher. If to a solution of albumin a 3 per cent. carbolic acid solution be added, no precipitate is formed, but if a 1 per cent. salt solution be also added, the albumin is thrown down. Römer‡ concluded that through the action of the salt a chemical compound was formed, and that the germicidal action of the mixture was due to this reaction. He found that Glauber's salt and bicarbonate of soda acted in the same way as common salt.

THE HOUSING QUESTION IN LONDON.—Small property in Bethnal Green often changes hands at a price which will only return the purchaser in rent a bare five per cent. on his capital. This leaves no margin for the necessary outlay on repairs or for other expenses. The new landlord calculates on being able to recoup himself by screwing up the rents, and the unfortunate tenants must pay or submit to be turned out. The Chief Inspector in his report instanced some streets where the tenants had paid for many years 9s. and 9s. 6d. per week for their houses. The property changed hands, and the rents were raised to 11s. and 11s. 6d.; again the houses were sold, and the new owner promptly increased the rents to 18s., 19s., and 19s. 6d. per week. Now the incomes of the people who inhabit these small houses are not elastic, so that in order to meet the increased rent they are constrained to take in lodgers and to sublet to the utmost capacity of the dwelling, hence overcrowding. When the overcrowding caused in this way was discovered, notices were served upon the owners to abate it, and several families were turned out. The committee, however, felt compelled to discontinue proceedings, as some of the unfortunate persons who were ejected were absolutely unable to obtain accommodation elsewhere, and something very nearly approaching a public scandal resulted. Two families were found living in the yards and washhouses of the premises from which they had been evicted. One family, consisting of a man, his wife and three children, had had no shelter for a fortnight, beyond the walls of a back-yard into which their sticks of furniture had been thrown.—Dr. G. P. Bate, M.O.H. Limehouse, A.R., 1898.

* Cent. f. Bakt., 1898, xxiv., No. 24.

† Arch. f. Experiment. Pathologie, xxvii., 1, and Cent. f. Bakt., xx, 16, 17.

‡ Clinica Veterin., Journ. d'Hygiène, April, 1899.

ON ACCUMULATIONS OF LONDON HOUSE REFUSE DEPOSITED IN CERTAIN PARTS OF THE DISTRICT, ALLEGED TO HAVE CAUSED NUISANCE AND INJURY TO HEALTH.*

DURING 1898 representations from time to time were made to the Local Government Board by private residents in the Eton rural district concerning certain accumulations of London house refuse on the banks of the Grand Junction Canal, in the parish of Langley Marish. These accumulations, it was alleged, frequently gave rise to nuisance, as to which no efficient remedial action had been taken by the Rural District Council. Moreover, the Board were informed that it was locally believed that these deposits occasioned sickness among persons dwelling in their vicinity, and that they had contributed to maintain the prevalence of diphtheria in this part of the district in 1898.

Having regard to these representations, the Board instructed me, when in the district investigating the recent diphtheria prevalence, to make also some inquiry into this matter.

These deposits consist of the contents of Kensington dust-bins. The refuse is carried by canal boats plying at frequent intervals between London and Langley Marish, the contractor with the Kensington Vestry for its removal being Mr. Studds, a brickmaker, of Middle Green, Langley. It arrives in the form of "rough dust," which consists of ashes and ash-dust mingled with rubbish, such as tin cans, old shoes, broken crockery, straw, vegetable refuse (chiefly cabbage-stalks), portions of old palliasses, and rags. No animal matter was observed at the date of my inspection, save a few bones. The ashes and ash-dust are used in brickmaking, and give the rough dust its value. Deposited in heaps on the banks of the canal, the rough dust is dug out with forks and sifted through sieves by hand. The fine dust thus obtained is mixed with the brick-clay before firing, while the coarser stuff rejected by the sieves is hand-picked by boys to obtain the ashes, which are used for burning bricks. The combustible part of the remaining refuse is then loaded on to trolleys, and burnt in a destructor in the case of Studds' brickfields, or in other brickfields is wheeled away in barrows and buried under a foot of earth, to make good the void whence the brick-earth has been taken.

* From a Report to the Local Government Board by Ralph W. Johnstone, M.D., July, 1899.

At the date of my inspection, the weather being warm for October, and the wind very light, the odour of the "dust," though plainly perceptible at a distance of 100 yards to leeward, was not insupportably offensive, indeed not even when one walked upon the heaps. I was informed that in summer it was nauseating, and that the heaps "smoked." It is probable that fermentation and decomposition do in hot weather reach an advanced stage, since, according to Mr. Studds' foreman, the heaps usually stand eight or nine weeks before sifting. At my visit slight steaming was perceptible from one heap. The sifted heaps were not so offensive as the unsifted, but there was no strongly-marked difference between them. Both possessed the odour of rotting vegetables mingled with the characteristic sour smell of ash-bins.

The portion of the canal along which the heaps are situated is in the parish of Langley, chiefly between Trench's Bridge on the west and Langley Station Bridge on the east. One heap (Willett's) is half a mile east of Langley Station Bridge.

At the date of my visit accumulations were met with as follows: On the south bank of the canal, beginning at the west near Trench's Bridge, a barge moored to the south bank containing rough dust; 10 yards east an unsifted heap 15 feet high by 36 yards by 12 yards; 10 yards further a second heap, unsifted, of the same size; 10 yards further east a third heap, sifted; and 30 yards further a fourth, also sifted. Away from the canal bank was another small heap, 10 yards by 1 yard by 1 yard, adjoining the public road and not more than 40 yards from Providence Buildings. These heaps are all the property of Mr. Studds. Willett's heap, half a mile beyond Langley Station, on the south bank, is 40 yards by 17 yards and 14 feet high, mostly unsifted.

On the north bank of the canal the first heap, 90 yards east of Trench's Bridge, was 14 feet high by 17 yards by 14 yards, and was unsifted; the next, 10 yards further east, was also unsifted and similar in size; 15 yards further was a large heap, 69 yards by 17 yards and 10 feet high, unsifted. These heaps were, I was informed, the property of Mr. Cave. Three hundred yards further was a large unsifted heap, said to belong to Mr. Smith. All the measurements are approximate. The rough dust in all these cases was said to have been derived from the same contractor, Mr. Studds.

Besides the "rough dust" there is also imported into the district, for the use of the farmers, a manure known as "soft core," which consists of London street sweepings—that is, horse droppings and mud. It is brought from London by rail and by canal. When brought by rail, it is usually unloaded at Langley Station and carted

thence to the fields; when brought by canal, it is deposited in heaps at convenient spots along the banks. At the date of my visit there were some barges unloading soft core near Langley Station, and some heaps of this material 150 yards west of Langley Middle Green School, on the north bank of the canal. The contents of the barges appeared to be at least as offensive as the rough dust, but the heaps near the school, which had been deposited some months previously, were not at all offensive, although they were being dug out and spread when I inspected them. Complaints were made by residents near Langley Station of smell arising from the soft core during unloading of the railway trucks.

The complaints made to the Board related solely to the London house refuse, and not to the soft core, and I did not hear of apprehensions entertained locally that this soft core was in any way responsible for illness of persons living in the neighbourhood. Yet, as the principal places of unloading and deposit of soft core are close by the rough dust heaps, it is hardly possible here to consider them apart.

Firstly, as regards nuisances. Various residents of the district (including Mr. Major, chairman of the Parish Council, and Mr. Francis, Vicar of Langley, and member of the Eton Rural District Council) complained of offensive smells arising from the heaps and of swarms of flies attracted to the neighbourhood. I therefore made inquiries of several of the complainants and of the occupants of certain cottages in proximity to the heaps, who were to be thought of as having had exceptional opportunities of observing nuisance of this sort. As a result I could not fail to come to the conclusion that the heaps, by reason of odours and of the dust blown from them, are from time to time, and especially in hot weather, liable to become objectionable to persons dwelling in their vicinity.

Secondly, as to evidence of injury to health. Allegations were locally made that diphtheria and certain cases of tonsillitis were to be attributed to emanations from these dust-heaps.

The facts which I learnt with reference to the question of diphtheria were as follows: From November, 1893, to November, 1896, Kensington house refuse was deposited by the side of the canal in Iver, another parish of the Eton Rural District, whence it was removed to Langley parish in November, 1896, on account of proceedings instituted by a private individual against Mr. Studds.

If it were to be assumed that the rough dust had habitually acted as a carrier of diphtheria infection, it might be expected, first, that diphtheria incidence on Iver during 1894, 1895, 1896, would, by contrast to the rest of the rural district, have been disproportion-

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ately great, and on Langley during 1897-98 would similarly have been in excess. In the second place, it might be expected that if, as is suggested, the specially severe incidence of diphtheria during 1898 on Langley was due to rough dust, in that year there would be some special reason for increased infectivity of the dust, such as exceptional prevalence of diphtheria in Kensington.

The following table shows the number of notified diphtheria cases in Langley and in Iver for the past six years as compared with the remainder of the district :

Year.	Population, 1891.	1893.	1894.	1895.	1896.	1897.	1898.
Cases of diphtheria notified in Iver ...	2,416	4	1	1	...	...	6
Cases of diphtheria notified in Langley	2,374	1	1	7 ^c	3	1	50
Cases of diphtheria notified in rest of Eton Rural District	16,715	20	28	13	4	13	71

It will be seen from this table that during 1894, 1895, and 1896, Iver cannot be said to have had an undue share of diphtheria, nor had Langley in 1897.

On examining the records of the Medical Officer of Health of Kensington, it was found that in the years 1894, 1895, 1896, and 1897, the number of cases of diphtheria notified in Kensington was respectively 280, 561, 377, and 322. In 1898 the number of cases notified fell to 215. There does not appear, therefore, any reason for assuming a special infectivity of Kensington house refuse in 1898.

Next as to local incidence of diphtheria in relation to these dust-heaps in 1898.

Between a quarter and half a mile from the western part of the line of dust-heaps along the canal bank are two hamlets—Middle Green on the north side of the canal, and Langley Marish on the south. For half a mile to north of the eastern half of the line of heaps there are scarcely any dwellings; the nearest dwellings on the south are a few cottages called Checquers Bridge Cottages, within 200 yards of Willett's heap, and dwellings in Meadfield Road about a quarter of a mile south of the canal.

Heavy incidence in 1898 of diphtheria on parts of Langley Marish, on cottages in Meadfield Road, and occurrence of diphtheria in one of Checquers Bridge Cottages, led to local suspicion that infection

* These seven cases occurred in Langley New Town, which is practically part of Slough, and not near the locality in which "dust" was subsequently deposited.

in these cases had been contracted from the dust-heaps. Either, it was suggested, infective particles had been carried from these heaps through the air for several hundreds of yards, to reach the dwellings which became invaded, or infection had been contracted by children playing on or near the heaps. The facts obtained, however, did not lend much support to the first of these suggestions. Thus in Langley Marish hamlet all the invaded dwellings were comprised in a row of cottages called Providence Buildings. In the rest of the hamlet, very little further from the heaps alongside the canal than Providence Buildings, no case occurred. It should be added, however, that, in addition to heaps on the canal side, there was a small heap of rough dust in a neighbouring brickfield, nearer to Providence Buildings than to the rest of the village. Again, although incidence of diphtheria on Meadfield Road, south of the line of heaps, had been considerable, yet in the hamlet of Middle Green, at a similar distance north of the canal, no cases of diphtheria had occurred. Moreover, Meadfield Road may be regarded as a northern prolongation of the village of Horsemoor Green, parts of which are nearly a mile from the line of heaps. Numerous dwellings in Horsemoor Green were invaded during 1898, and there was no exceptional incidence upon those situated in the northern part of the village.

It is not unusual for children in this neighbourhood to play on or near the dust-heaps, and certain of the sufferers from diphtheria were said to have been in the habit of so doing. Among those employed at sifting the dust, however, no cases of diphtheria were heard of, though some were children and young adults.

I may, however, note that Dr. Miller, district medical officer for both Iver and Langley, informed me that during the period in which the dust-heaps were deposited in Iver there had prevailed there an unusual amount of follicular tonsillitis, marked in many cases by great subsequent weakness. Furthermore that, after the heaps had been removed from Iver to Langley, there was "a definite improvement in throat troubles" at Iver, and an appearance of the same species of tonsillitis at Langley. In connection with Dr. Miller's statement it may be mentioned that three days after first inspecting the dust-heaps I experienced an attack of follicular tonsillitis such as he describes. I had not previously had any tonsillar trouble.

On review of the whole case there seemed little indication that persons had come by diphtheria infection as a result of direct association with infectious matters in the heaps. And similarly it appeared impossible, on the facts obtainable, to accept the sugges-

tion that particles conveying the specific infection of diphtheria, if at any time present among the refuse composing the heaps, had been carried for hundreds of yards atmospherically and had produced diphtheria in those who inhaled them. But it may be conceded that there is general ground for believing that emanations of decomposing organic matter may be capable of producing sore throat and lowering the vital resistance, and of thus predisposing to diphtheria. There can be no question that from time to time, under favourable conditions of temperature, wind, and disturbance of the heaps (by sifting or unloading) emanations were given off during the summer of 1898. But whether in the past year the dust-heaps did thus indirectly conduce in large or in small measure to that diphtheria prevalence which residents in the neighbourhood sustained, in common with residents in other parts of the district, the facts at my disposal did not suffice to show.

A TEST FOR FORMALDEHYDE.—The following test for formaldehyde is in use in the laboratory of the State Board of Health, Massachusetts: 10 cubic centimetres of hydrochloric acid (specific gravity 1.2) are added to an equal amount of milk in a porcelain dish. A drop of dilute ferric chloride solution is added, and the mixture heated to just below the boiling-point and vigorously stirred. The presence of formalin is indicated by a violet coloration, varying in depth with the amount present. It is stated that by this 1 part of formaldehyde in 500,000 parts of milk is readily detected before the milk sours; after souring, the limit of delicacy is about 1 part in 50,000.

DISINFECTION OF RAILWAY CARRIAGES.—Dr. Navarre* contends that third class compartments, which have been found in Germany to be four times as rich in bacteria as those of other classes, ought to possess smooth surfaces and rounded angles. The woodwork should be protected by varnish, which may be readily washed and disinfected. The floor should be covered with linoleum, which may also be readily cleansed and changed. The partitions and other woodwork should be carefully washed with water containing soda, to be followed by a 1 in 1,000 sublimate spray. For the second and first class carriages, Dr. Navarre would do away with the stuffed cushions, which become full of dust impossible to thoroughly displace. He would cover the seats with flexible leather, and the floor with linoleum. If movable cushions are retained, they should be beaten mechanically at regular periods. Formic aldehyde should be generated in these carriages, being not only an excellent deodorant, but a reliable disinfectant. The smell of the gas disappears rapidly after a short exposure of the interior of the carriage to the air.

* *Journal d'Hygiène*, No. 1,199, September 14th, 1899.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

THE annual general meeting of the Society was held at the Holborn Restaurant, London, on Friday, October 13th, 1898. Present: Dr. A. Newsholme (President) in the Chair; Drs. E. Gwynn, R. Dudfield, T. W. H. Garstang, J. R. Kaye, J. Priestley, A. Bostock Hill, J. Groves, Hugh Stott, Arthur W. Scatliffe, W. H. Kempster, J. Shaw, J. Scott Tew, C. H. W. Parkinson, T. E. Hayward, J. Robertson, J. H. Jones, J. Tubb Thomas, T. E. Hill, H. E. Armstrong, S. Barwise, G. Millson, L. T. F. Bryett, F. C. Tothill, H. Beale Collins, E. H. Snell, W. H. Symons, J. Dixon, O. Eaton, H. Cooper Pattin, A. W. Harris, S. R. Lovett, W. T. G. Woodforde, J. C. Thresh, and F. J. Allan.

INDUCTION OF NEW PRESIDENT.—Dr. E. GWYNN, the retiring President, said his duty was a very agreeable one, viz., to induct the new President, Dr. Arthur Newsholme. Dr. Newsholme had been so long in the van of progress in sanitation that his name was well known to them all. He had been endowed by Nature, if he would allow him (Dr. Gwynn) to say so, with a personality that attracted all who knew him. The Society was honoured by his election as President, and he (Dr. Gwynn) wished him a very successful year of office.

Dr. NEWSHOLME, in taking the Presidential Chair, said he very highly appreciated the honour which the Society had conferred upon him. It came upon him unexpectedly, but was none the less appreciated. He would do his utmost to properly discharge the duties of the office, and he hoped that at the end of his year of office he might carry away as great a measure of the esteem and respect of his colleagues and fellow-members as did Dr. Gwynn in retiring to the comparative quiet of a vice-presidency.

VOTE OF THANKS.—Dr. GROVES was afraid, in their anxiety to welcome the new President, they were sometimes apt to forget the outgoing. In Dr. Gwynn they had had a sympathetic and kindly President who had given them a very pleasant year. The least return they could make was to accord him a very hearty vote of thanks, and he begged to move accordingly.

The motion was seconded by Dr. MILLSON, and carried unanimously.

Dr. GWYNN, in expressing his acknowledgment of the vote of thanks, said that even if these votes were more or less customary, they fell very pleasantly on the ear, and for himself he greatly appreciated their kindness. While many pleasures slipped from all as time rolled on, there ever remained the good opinion of those they worked amongst, who knew their work, and whose opinion they valued and respected.

MINUTES.—The bye-laws having been suspended, the minutes of the last annual meeting, on October 14th, 1898, were taken as read, and were approved and signed by the President.

CORRESPONDENCE.—The HON. SECRETARY read letters from Dr. Alfred Hill and Dr. W. Williams consenting to give evidence on behalf of the Society before the Departmental Inquiry into the use of preservatives in food.

A number of letters apologizing for absence were also read.

ANNUAL REPORTS.—The HON. SECRETARIES submitted the following reports for the year ending September 30th last, and reported that the same had been published in the October issue of PUBLIC HEALTH, viz.:

- (a) Report of Council.
- (b) Report of Editor.
- (c) Report of Treasurer, with balance-sheet, etc.

Resolved unanimously that the same be taken as read.

Resolved unanimously, on the motion of Dr. BOSTOCK HILL, seconded by Dr. GROVES, that the same be approved and adopted.

ORDINARY REPORTS OF COUNCIL.—The HON. SECRETARY submitted the following reports of Council:

September 15th, 1899.

1. Your Council have received a communication from the Superannuation Conference, under date of July 28th last, asking whether the Society is in favour of reintroducing the Local Authorities (Officers) Superannuation Bill next Session in its present form or as an adoptive Act only.

Your Council recommend that the Hon. Secretary be instructed to state in reply thereto that the Society is not in favour of the re-introduction of the Local Authorities (Officers) Superannuation Bill.

2. Your Council have received a letter from the Secretary of the Departmental Committee appointed by the President of the Local Government Board to inquire into the use of preservatives and colouring matters in food, inquiring on behalf of the Chairman, Sir Herbert Maxwell, whether the Society would desire to nominate two witnesses to tender evidence before the Committee.

Your Council have requested Dr. Alfred Hill and Dr. W. Williams to attend the inquiry and give evidence on behalf of the Society in support of the resolutions adopted by the Society at its meeting in April last.

3. The Finance Committee have reported that they have submitted the question of the payment of travelling expenses of Branch representatives attending meetings of the Council to the various Branches of the Society, and that the Committee have considered the replies received, and concluded that it is undesirable at present to make any alteration in the Articles providing for the payments to be made to Branches, or to undertake the payment of travelling expenses of Branch representatives attending meetings of the Council at present. Your Council have adopted the report of the Committee.

4. Your Council have had before them applications from the Northern and Scottish Branches of the Society for an increase in the proportion of subscriptions to be allotted to such Branches, and have received a report from the Finance Committee on the subject.

Your Council have resolved that the proportions of subscriptions payable to the Northern and Scottish Branches for the year ending September 30th, 1899, be increased, so far as Fellows and ordinary Members are concerned, from 7s. 6d. to 10s. per head.

5. Having fully considered the question of the Census of 1901, together with a report from the Parliamentary Committee, who have had before them the views of the Branches on the question, your Council have unanimously adopted the following resolutions:

"(a) That the Census Act of 1900 should provide for an Intermediary Census in 1906."

"(b) That March 21st (Palm Sunday) would be a suitable day on which to take the Census in 1901."

"(c) That the Census Act should be passed as early as possible, and certainly not later than Easter, 1900, in order that there may be time for proper arrangements to be made for taking the Census."

"(d) That every medical officer of health in England and Wales should be asked to bring resolution (c) before the Member of Parliament representing his district."

"(e) That no enumeration area should be permitted to extend into more than one sanitary area."

"(f) That the time has arrived when the tabulation of Census returns should be primarily based on sanitary areas."

"(g) That the superintendent or local registrar or other responsible officer should be instructed to confer with the medical officer of health before deciding on the enumeration areas."

"(h) That the age and occupation of the inhabitants of every sanitary area and sub-districts of the larger areas should be separately tabulated and published."

"(i) That on an undertaking being given not to publish any detailed results obtained prior to the issue of the official report of the Census, medical officers of health should have access to the enumeration papers referring to their respective districts."

Your Council have instructed the Hon. Secretary to forward resolutions (a), (b) and (c) to the Home Secretary, the President of the Local Government Board, and the other Government officials whom they may concern, with a request that they may be incorporated in the Act providing for the Census 1901; to embody resolutions (e), (f), (g), (h) and (i) in a communication to the Registrar-Generals urging their adoption, and to take the necessary steps for carrying out resolution (d).

6. Your Council have to report that, in accordance with the provision of the Articles of Association, the following representatives have been elected to serve on the Council of the Society for the ensuing year:

Branch.	President.	Representatives.
Metropolitan ...	Dixon, J. ...	Collingridge, W. Davies, S. Field, Oliver. Millson, G. Priestley, J. Roberts, H. W. Sykes, J. F. J. Smith, W. R. Yarrow, G. E.
Birmingham and Mid-land ...	Read, Mabyn ...	Hill, A. Bostock. Reid, George.
Northern ...	Armstrong, Henry ...	Hill, T. Eustace. Scurfield, Harold.
North-Western ...	Hayward, T. E. ...	Sergeant, E. Robertson, J.

Branch.	President.	Representatives.
Yorkshire	Fairclough, T. B. ...	Kaye, J. Wilson, J. Mitchell.
West of England and South Wales	Symons, W. H. ...	Heaven, J. C. Jones, J. Howard.
Home Counties	Tew, J. Scott ...	Ashby, Alfred. Shadwell, StClair B.
Southern	Kelly, C. ...	Browning, B. Groves, J.
Scottish	Hay, Matthew ...	McVail, J. C. Templeman, C.

October 13th, 1899.

1. Your Council have to report that, having considered a communication from Dr. Borthwick suggesting the desirability of forming a Branch of the Society in South Australia, they have, in accordance with the provisions of the Articles of Association, unanimously resolved to constitute a South Australian Branch.

2. Your Council have received a report from the auditors, certifying the accounts, as published in the October issue of PUBLIC HEALTH, to be correct.

3. Your Council have resolved that in future the Finance and Editorial Committees shall be combined, and shall be known as the Finance and Journal Committee.

4. Your Council have elected the following standing Committees for the ensuing year :

FINANCE AND JOURNAL.

The President.	Dr. J. Groves.
The Treasurer.	Dr. E. Gwynn.
The Editor.	Dr. A. Bostock Hill.
The Hon. Secretaries.	Dr. J. R. Kaye.
Dr. H. Armstrong.	Dr. S. R. Lovett.

Dr. H. W. Roberts.

PARLIAMENTARY.

The President.	Dr. W. Collingridge.
The Treasurer.	Dr. J. Groves.
The Hon. Solicitor.	Dr. J. C. McVail.
The Editor.	Dr. S. R. Lovett.
The Hon. Secretaries:	Dr. F. Vacher.
Dr. A. Ashby.	Dr. W. T. G. Woodforde.

Dr. G. E. Yarrow.

TUBERCULOSIS.

The President.	Dr. J. Niven.
Dr. A. Bostock Hill.	Dr. E. Seaton.
Dr. E. Gwynn.	Dr. J. F. J. Sykes.

Dr. Vacher.

DIARRHŒA—CLASSIFICATION OF DEATHS.

The President.	Dr. E. Gwynn.
Dr. A. Ashby.	Dr. R. Dudfield.
Dr. W. Gruggen.	Dr. W. T. G. Woodforde.
The Hon. Secretary, Dr. F. J. Allan.	

INFECTIOUS DISEASES MEMORANDA.

The President.	Dr. E. Gwynn.
The Treasurer.	Dr. Ashby.
The Editor.	Dr. Kenwood.
The Hon. Secretary, Dr. F. J. Allan.	

5. Your Council, having considered a communication from the Hon. Secretary of the Sanitary Inspectors Examination Board, submitting copy of regulations and syllabus of their examination, have resolved to request the Conjoint Examining Board for Sanitary Inspectors to consider the advisability of withdrawing "statistical methods" from the syllabus of their examination.

Resolved unanimously that the reports be received and adopted.

ELECTION OF HONORARY FELLOW.—The Society then proceeded to ballot for the election of an Honorary Fellow.

The HON. SECRETARY reported that the Right Hon. Sir Herbert Eustace Maxwell, Bart., M.P., F.R.S., of 49, Lennox Gardens, S.W., and Monreith, Wigtownshire, had been nominated by the Council in accordance with the Articles of Association.

A ballot was then taken, and the PRESIDENT declared the Right Hon. Sir Herbert Eustace Maxwell unanimously elected.

ELECTION OF MEMBERS.—The following candidates having been duly nominated, a ballot was taken, and the PRESIDENT declared the same unanimously elected :

AS FELLOWS.

- Behrendt, M. R. J.**, L.R.C.P., 30, Frodingham Road, Scunthorpe, M.O.H. Scunthorpe, Brumby, and Frodingham U.D.C.
- Browne, B. S.**, L.R.C.P., Alcester, M.O.H. Alcester U.D.C.
- Buttery, Geo. B.**, L.R.C.P., Church Square, Oldbury, M.O.H. Oldbury U.D.C.
- Bollen, C.**, L.R.C.P., Port Adelaide, South Australia, M.O.H. Port Adelaide.
- Coates, Harcourt**, L.R.C.P., M.R.C.S., 17, Endless Street, Salisbury, M.O.H. Salisbury M.B.
- Coles, Charles**, M.D., 16, Great James Road, Leicester, M.O.H. Leicester and Rutland C.S.D.
- English, Edgar**, M.D., D.P.H., 1, Thorne Road, Doncaster, M.O.H. Swinton U.D.C.
- Evans, J. H.**, Prospect, South Australia, M.O.H. Prospect.
- Gregerson, W. G.**, West Torrens, South Australia, M.O.H. West Torrens.
- Griffith, Augustine**, M.D., 47, Walsingham Road, Hove, M.O.H. Hove M.B.
- Harding, James Joseph**, J.P., L.R.C.P., D.P.H., the Wigwam, Ballincollig, co. Cork, M.O.H. Ballincollig.
- Hayward, John W.**, M.R.C.S., Weston House, Whitstable, M.O.H. Whitstable U.D.C.
- Hitchon, Hy. Hardacre Irving**, M.R.C.S., L.R.C.P., Rock House, Heywood, M.O.H. Heywood M.B.
- Lock, John Griffith**, M.R.C.S., L.R.C.P., 2, Rock Terrace, Tenby, M.O.H. Tenby U.D.C.
- Marsh, J. H.**, M.R.C.S., L.R.C.P., Cumberland House, Macclesfield, M.O.H. Macclesfield C.B.
- Morison, Fred Hughes**, M.D., D.P.H., Raglan Place, West Hartlepool, M.O.H. West Hartlepool M.B.

Tothill, Fk. Chas., M.B., C.M., High Street, Staines, M.O.H. Staines U.D.C.
 Vernon, Claude M., M.R.C.S., L.R.C.P., Sunnyside, Ashford, Kent, M.O.H.
 Ashford U.D.C.
 Wigg, Hy. Higham, M.D., Unley, near Adelaide, South Australia, M.O.H.
 Unley.

AS ORDINARY MEMBERS.

Beggs, Jas. Edward, M.D., B.C., D.P.H., Park Hospital, Hither Green.
 Eyre, John Wm. Hy., M.D., D.P.H., Charing Cross Hospital Medical School.
 George, Isaac, M.R.C.S., D.P.H., 29, St. John's Wood Road, N.W. (Assoc.
 I.S.M.O.H.).
 Hardcastle, Wm. B. Hy., the Dispensary, Newcastle-on-Tyne.
 Ormerod, Arthur Lathom, M.A., M.B., D.P.H., M.R.C.S., L.R.C.P., St.
 Bartholomew's Hospital.

AS AN ASSOCIATE.

Willcox, Wm. Hy., L.S.A., B.Sc., 14, Blomfield Street, Paddington, W.

NOMINATIONS.—A number of candidates were then nominated for election at the next meeting.

Mr. GARSTANG then read a paper on "Fixity of Tenure and Superannuation."*

A number of letters addressed to Mr. Garstang were read by the HON. SECRETARY supporting the position taken up by Mr. Garstang.

At the close of the discussion the following resolutions, proposed by Dr. R. DUDFIELD, and seconded by Dr. GROVES, were put to the meeting:

"(1) That the superannuation of medical officers of health and sanitary inspectors should be dealt with by special legislation apart from that for other officers of local authorities."

"(2) That any scheme of superannuation of such officers should provide for—

(a) Fixity of tenure for such officers, and

(b) The payment of all contributions to a common 'superannuation fund' in lieu of the current rate accounts of the respective districts served by such officers."

"(3) That the British Medical Association be asked to amend the "Medical Officers of Health Superannuation Act (sic), 1899," drafted by them, so as to include sanitary inspectors, and to introduce such (amended) measure in the ensuing Session of Parliament."

On resolution No. 1 there appeared:

In favour of the same	...	...	...	13
Against	...	...	...	8

The PRESIDENT declared the same to be carried.

Resolutions 2 and 3 were agreed to *nem. con.*

It was moved by Dr. R. DUDFIELD, seconded by Dr. THOMAS, and resolved: (a) That in the event the British Medical Association agreeing to adopt the request contained in the third resolution, this Society pledges itself to support the Bill to the best of its ability, and (b) that the matter be referred to the Parliamentary Committee to confer with the British Medical Association thereon.

* See p. 68 of this issue.

It was moved by Dr. BARWISE, seconded by Dr. TUBB THOMAS, and resolved, that the question of circulating reprints of Mr. Garstang's paper be referred to the Council of the Society.

On the motion of Dr. SCATLIFFE, seconded by Dr. BOSTOCK HILL, a hearty vote of thanks was accorded to Mr. Garstang for his paper.

Home Counties Branch.—A meeting of this Branch was held at the Holborn Restaurant on Thursday, October 12th. The following members were present: Drs. Tew (President), Woodforde, Thresh, Foulerton, Ashby, Gruggen, Kenwood, Morison, Skinner, and Shadwell.

A letter was received from Dr. C. E. Paget, regretting that he was unable to attend the meeting.

The TREASURER presented his balance-sheet, which was adopted.

Dr. STCLAIR SHADWELL read a paper on "The Inebriates Act, 1898, regarded from a Public Health Point of View."* A discussion followed.

ANNUAL DINNER.

At the close of the annual meeting of the Society a large number of the members and their friends dined together in the Gordon Saloon at the Holborn Restaurant, the President (Dr. Newsholme) in the Chair. Among the visitors present were: Sir Walter Foster, M.P.; Dr. Church, the President of the Royal College of Physicians; Dr. Parsons (of the Local Government Board); Dr. Tatham (of the General Register Office); Mr. George King, F.I.A.; the Mayor of Brighton; the Mayor of Southampton; Alderman Walton (the Chairman of the Public Health Committee, Southampton); Mr. R. W. Dibdin, J.P. (Chairman St. Giles Board of Works); Dr. Boyd Joll; the Town Clerk of Brighton; the Clerk to the Wandsworth Board of Works. Letters and telegrams regretting inability to be present were received from Lord Lister, Sir Dyce Duckworth, M. Jacques Bertillon, Sir Richard Thorne Thorne, Dr. Power, The President of the Royal College of Surgeons, Dr. Ward Cousins, Mr. G. E. Loder, M.P., Mr. Walter Emden, J.P., L.C.C., Sir Charles Cameron, Sir Henry Littlejohn, and many others.

TOAST LIST.

"The Queen and Royal Family:" Proposed by the President.
 "The Public Health Service:" Proposed by Sir Walter Foster, M.P.; response by H. F. Parsons, Esq., M.D., and Professor A. Bostock Hill.
 "The Universities and Medical Corporations:" Proposed by E. Gwynn, Esq., M.D.; response by W. S. Church, Esq., M.D., President Royal College of Physicians, and Henry Armstrong, Esq., D.Hy.
 "The Incorporated Society of Medical Officers of Health:" Proposed by Alderman Walton, Chairman Health Committee, Southampton; response by the President.
 "Kindred Societies:" Proposed by Shirley F. Murphy, Esq., M.R.C.S.; response by George King, Esq., F.I.A.
 "The Visitors:" Proposed by J. Groves, Esq., M.D.; response by J. F. W. Tatham, Esq., M.D., and G. H. Hills, Esq.
 "The Press in Relation to Public Health:" Proposed by A. Wynter Blyth, Esq., M.R.C.S.; response by R. Dudfield, Esq., M.B.
 "The Officers of the Society:" Proposed by G. Millson, Esq., M.R.C.S.; response by W. H. Kempster, Esq., M.D., and F. J. Allan, Esq., M.D.

* See p. 80 of this issue.

MASSACHUSETTS TWENTY-NINTH ANNUAL HEALTH REPORT.

CEREBRO-SPINAL MENINGITIS.

IN addition to the usual features of this report, reference is made to an epidemic of cerebro-spinal meningitis in Boston and neighbourhood, which was responsible for a total of 184 deaths in Boston alone. The Board commissioned Dr. Councilman, Professor of Pathological Anatomy at Harvard, to investigate the pathology of the disease, and his special report is obtainable on application to the Secretary of the Board.*

SEWAGE PURIFICATION.

The studies of the previous two years were continued in regard to the composition and methods of disposal of various manufacturing waste liquors, and especially as to whether or no such liquors could be filtered and purified by the same processes which had been successful in the purification of ordinary city sewage.

Tannery No. 1.—This tannery is engaged in preparing and tanning calf-skins, and two germicides are used in large quantities, the principal being sulphide of arsenic, which is added to the liquor in the process of freeing the skins of hair. A ton or more of this chemical is used each month, mixed with lime to form a soluble salt of arsenic, and the sewage always contains a large quantity in suspension and in solution. It was found in 1897 that, by passing this sewage through a coke strainer, the arsenic could be completely removed from it, on account of the formation of a double insoluble salt of iron and arsenic, and that after this preliminary straining the sewage could be purified by filtration through sand by the actions of nitrification and oxidation as in the purification of ordinary sewage.

Tannery No. 2.—The sewage from this tannery contained a large amount of sludge which rapidly clogged ordinary sand filters, and thus rendered it impossible to operate them at high rates. It was therefore decided to study the purification of this sewage by straining through coke. The strainer was $\frac{1}{8}$ of an acre in area, and contained 2 feet of coke, the upper portion being coke breeze and the lower portion coarser coke. It was operated at rates varying from 250,000 to 300,000 gallons per acre daily, and has been entirely successful in dealing with the applied sewage, having removed about 85 per cent. of the crude organic matters, measured by the determinations of albuminoid ammonia, and 83 per cent. by that of the oxygen consumed. This sludge has clogged the surface of the strainer several times during the year, and has had to be removed. While no experiment upon a large scale has been made upon the question of burning this deposit, considerable fat is contained in it, and this, together with the aid to combustion given by the coke removed with the sludge, as shown by a laboratory experiment, makes it clear that it could be easily disposed of in this way. The effluent of this strainer, even after the removal of so large a percentage of organic matter as shown by the figures above, is fully as strong as ordinary city sewage, but can be easily disposed of at a high rate upon ordinary sand filters. It is noticeable that, although nitrifica-

* 142, State House, Boston.

tion does not take place in the strainer, still, its effluent is often fairly clear, while the applied sewage is always highly coloured, either black, red, or brown, according to the work being carried on in the tannery.

Waste Liquors from Paper-mills.—These include those produced in (a) washing and preparing the stock, e.g., old ropes, bagging, etc.; and (b) making this stock into paper. The volume of the first class is much less than that of the second, but its organic pollution is much greater. Filtration through $4\frac{1}{2}$ feet of sand, at an average daily rate per acre of 78,000 gallons, resulted in the removal of only a small percentage of the organic matters present. The passage of the mixed liquors through a coke strainer about 1 foot in depth, with coke breeze forming the upper portion, at a daily rate of 850,000 gallons per acre, effected the removal of about 63 per cent. and 70 per cent. of the organic matters determined respectively as albuminoid ammonia and as oxygen consumed, the colour also being much improved. A cinder strainer produced equally good results chemically, but could not be operated so rapidly, as the cinders crumbled and clogged the pores. On the surface of both strainers a mat-like mass of paper and dirt accumulated, and was periodically rolled up and removed. Having regard to the large volume of the liquors and the carbonaceous rather than nitrogenous character of the polluting matters, treatment by some system of "sedimentation and straining, rather than filtration and nitrification, is probably the practicable method of procedure."

Waste Liquors from scouring Wool.—Owing to the great pollution of this liquor with dirt, wool-fat, and soap, the only economical methods of dealing with it are by evaporation, or some form of chemical precipitation, and the separation of the fats and chromate of potash from the sludge, or a separation of the fats by means of acid and subsequent filtration of the liquor. Probably the second method is the most feasible.

Liquors from rinsing the Wool after scouring.—When filtered through $4\frac{1}{2}$ feet of sand, at a rate equal to 120,000 gallons per acre daily, the effluent was free from organic matter, but nitrification did not take place. When, however, a small proportion—about one-fifth—of city sewage was added to the applied liquor, nitrification was quickly established and the character of the effluent much improved.

CITY SEWAGE.

Effects of Frost.—It was found that a filter containing sand of an effective size of 0.48 mm. is less likely to become frozen and to be rendered useless by accumulated ice than a filter of finer sand.

Filtration.—Rapid filtration of sewage through gravel filters with forced aëration was further tested, but the results obtained were not such as to give reason for believing that the method would be practicable upon a working scale. Further experiment was made as to sand filtration, preceded by sedimentation or by chemical precipitation, and the superiority of coke filters for this purpose is noted. Intermittent filtration through cinder filters, "after the fashion of the so-called bacterial filters in England," was also investigated. The results were, on the whole, as good if not better than those obtained from the aerated gravel filters described in previous reports; but it is considered that the filters have not been in use long enough to show whether or not this high rate (533,000 gallons per acre daily) can be maintained year after year without seriously clogging the filters, and perhaps destroying their efficiency. A gravel filter operated in this manner from 1894 to

1897 failed signally owing to repeated clogging, and the interesting observation was made that during a period of two months' rest, and whilst air was being aspirated almost continuously through its pores, the stored organic matter in the filter increased the carbonic acid in the air drawn through it more than fourfold.

WATER FILTRATION.

Experiments were undertaken to determine the efficiency, as tested by the percentage removal of *B. coli communis*, of continuous and of intermittent filtration. In the latter the filter was allowed to drain to such an extent that its surface was uncovered and free from water for two hours daily. The following tabulated particulars will facilitate comparison:

Sand Filters, each $\frac{1}{200}$ Acre in Area.

No.	Operation.	Average Rate per Acre daily.	Average Depth of Affluent.	D'pth of Sand.	Size of Sand Grains.	Sand placed in Filter.	Scraped during Year.	Bacteria removed %.	Actual No. of Bacteria in Effluent.
8A	Continuous	4,247,000 gals.	15 in.	45 in.	0.28 mm.	Sept., '98	16 times	99.43	39 per c.c.
3B	Intermittent	3,276,000 gals.	15 in.	45 in.	0.23 mm.	Sept., '98	23 times	99.08	73 per c.c.
7A	Continuous	3,654,000 gals.	17 in.	20 in.	0.26 mm.	April, '97	11 times	97.43	204 per c.c.

Both from a chemical and bacterial point of view the two filters (8A and 3B) containing the greatest depth of sand have given the best results. From April to November inclusive filters 8A and 3B were nearly equally efficient; but during January, February, March, and December the efficiency of 8A was greater than that of 3B, which, being operated intermittently, had its surface exposed to the cold each day. Further, 8A was scraped many times less during the year, and while constant effort was made to operate 3B at a rate equal to 8A, it was found impossible to do so.

Investigation was also made as to the effect upon bacterial efficiency of increased numbers of bacteria in the applied water. It was found that such increase had no effect upon the average percentage removal of bacteria; but in September, when the number of bacteria in the affluent was greatest, the actual number in the effluent was twice as great as at any other time.

Growth of Bacteria in Filtered Water.—When filtered water is stored in a large body the number of bacteria decrease rather than increase. In experiments with bottles from $\frac{1}{2}$ pint to 12 gallons capacity, the bottles having the greatest side area compared with the volume of water contained showed the greatest increase day by day in the numbers of bacteria present. The bacteria grew as well with the bottles in the dark as when they were exposed to the light.

Filtration through Ashes.—Filter contained 48 inches of coal ashes; rate of filtration, 4,206,000 gallons per acre daily; effluent clear and colourless; removal of organic matter equal to that by best sand filters, but bacterial efficiency distinctly less.

Effect of Sand Filtration of Water on the Mortality from Enteric Fever.—For the six years preceding the construction of the Lawrence City filter the death-rate from enteric fever averaged 11.89 per 10,000

in the year of its construction, when filtered water was used for three months, it was 7.96, and the average for the five years that have since elapsed is 2.82.

FOOD AND DRUG INSPECTION.

A compound labelled "Santiago West Indian Lime-juice" was found by the State Analyst to contain no lime-juice, and to consist mainly of a solution of muriatic and salicylic acids, and therefore both harmful and fraudulent.

In Massachusetts the *milk standard* is fixed by law, and is:

	April to August (inclusive).	Other Months.
Total milk solids ...	12.0 per cent.	13.0 per cent.
Solids not fat ...	9.0 " "	9.3 " "
Fat ...	3.0 " "	3.7 " "

A new Adulteration of Food Act provides that food mixtures in packages be labelled as such with the name and *per cent.* of all ingredients therein; that the grade and makers' name of all canned foods be stamped on the cans, and that all those which have been soaked before canning be plainly marked "Soaked." Heavy penalties are provided for fraudulent stamping or labelling.

DIPHTHERIA.

Interesting particulars are set forth as to the extensive production and use of diphtheria antitoxin, and the results of test cultivations. The latter indicated a percentage of error of 32.4 in *positive*, and of 19.2 in *negative*, clinical diagnoses. The examination of the throats of 183 diphtheria patients indicated an average persistence of the bacilli therein of 3.95 weeks, whilst individual cases of their presence after 13 and 21 weeks respectively are recorded. The moral pointed is that bacterial examination of throat cultures should precede the release from isolation of all diphtheria cases, but one ventures to think that the practicability of isolating patients who are apparently well for periods such as 21 weeks may be open to question.

FIXITY OF TENURE AND SUPERANNUATION.—At a Sessional Meeting of the Association, held on October 21st in the Town Hall, Pontypool, Monmouthshire, the following resolution was unanimously passed: "That the Council and Members of the South Wales and Monmouthshire Sanitary Inspectors' Association, assembled at the Town Hall, Pontypool, wish to express their entire approval of the action taken by the members of the Incorporated Society of Medical Officers of Health, at their recent meeting held in the Holborn Restaurant, in adopting a resolution whereby the Sanitary Inspectors shall be included in the Superannuation and Tenure of Office Bill; and, further, are of opinion that this step taken by this important and influential body is likely to prove successful in bringing about Superannuation and Tenure of Office, . . . and promises to do all possible to further the promotion of the said Bill." It was further resolved that copies of the resolution be forwarded to Drs. Dudfield, Garstang, and Groves, and also to the Secretary of the Incorporated Society of Medical Officers of Health.

ARTIFICIAL MILK FOR INFANTS.

DRS. SCHWABB and K. B. Lehmann* have determined the compositions of a number of so-called "infants' milks" in the German markets, with the view of ascertaining how far they fulfilled their claims to resemble that of the human breast. Besides comparing human milk with that of the cow, they endeavoured to determine whether the changes in the composition of the former during the period of lactation were such as to indicate the necessity for using substitutes of similarly differing composition in the course of the artificial feeding of the infant.

They estimated the fat by Gerber's centrifugalization with sulphuric acid and amyl alcohol, and the sugar by Lehmann's recently-introduced iodometric process, as giving the most accurate results. For the determination of the nitrogen a modification of Kjeldahl's procedure was employed, 10 c.c. of the milk being boiled with 20 c.c. of concentrated sulphuric acid and 1 gram of mercury for three or four hours, a period which they found in some cases necessary, even with the most vigorous agitation, to obtain the full coloration; differing in this respect from the conclusion of Munk, that whereas eight to ten hours were required when copper was employed, one hour sufficed with mercury.

The samples were without exception so perfectly sterilized that bacteriological examinations were unnecessary. At the outset they were confronted with the difficulty of ascertaining what was the normal composition of human milk. The mean of cow's milk, on the other hand, is well known to be albumin and casein 3.4 per cent., fat 3.6 per cent., sugar 4.8 per cent., and salts, 0.7 per cent.; and there is no difference of opinion as to the fact that the percentage of albumin is higher, and of sugar lower, than in human milk; the salts being greatly in excess in that of the cow. But there is a general discrepancy, amid individual differences, between the older and the more recent analyses of human milk which makes the contrast between the latter and cow's milk far more marked than was formerly supposed. Analyses of human milk reported within the last five years quoted by them are those of:

	Albumin.	Fat.*	Sugar.	Ash.
E. Pfeiffer (100 analyses) ...	1.94	3.11	6.30	0.19
Heubner and Hofmann ...	1.03	4.07	7.03	0.21
Camerer (6 analyses) ...	1.73	2.60	6.96	0.24
Johannessen (140 analyses) ...	1.104	3.21	4.67	—
Backhaus (7 analyses) ...	1.62	4.02	6.71	0.25
Söldner ...	1.52	3.28	6.5	0.27

The older exhibit far greater divergences. The albumins, omitting two or three extreme and therefore questionable analyses, vary from 2 to 5 per cent., the fats from 1.7 to 4.2 per cent., and the sugar from 4.2 to 7.1 per cent. There is little doubt that the later estimates of albumins, 1.1 to 1.9 per cent., fat 3.2 to 4.0 per cent., sugar about 6.5 per cent., and ash 0.20 to 0.25 per cent., are the most accurate.

* Mün. Med. Woch., June 6th, 1899.

Then the differences from a chemical and quantitative point of view will be:

	Bovine.	Human.
Casein and albumin ...	3.4	1.1 to 1.9
Fats ...	3.6	3.2 to 4.0
Sugar ...	4.8	6.5
Salts ...	0.7	0.20 to 0.25

The percentages of fat are practically the same, and the deficiency of sugar may be made up by the addition of milk-sugar; but the crux lies in the nitrogenous constituents, which differ not only in quantity but in quality, as Biedert showed thirty years ago.

Very diverse views have been expressed as to the nature of these differences, but that maintained by J. Lehmann, and supported by Hempel, Struve, Schmid, Schlossmann, and others, that the casein and albumin are present in each in inverse proportions, the casein constituting the overwhelming excess in the cow's, and the albumin exceeding the casein in the woman's milk, is the correct explanation of the difference in the phenomena of their coagulation.*

As to the alleged differences between human milk in the earlier and later stages of lactation, and the consequent necessity for employing artificial milks of different constitution, Camerer and Söldner have observed a steady increase of the sugar, a decrease of the albumin, and irregular fluctuations in the percentage of fat, not only in the milk of the same woman, but in the mean of many, though not to any such an extent as to call for a change in the composition of the artificial substitute, and Johannessen, Heubner, Hofmann, Soxhlet, and Gärtner are of the same opinion.

Of the twenty varieties of "infants' milk" examined, the great majority contained an excess of casein and were deficient in sugar—that is to say, were too little removed in character from crude cow's milk; and a large number had so low a percentage of fat as to suggest their having been partially skimmed, or at least diluted, with a view to the reduction of the casein. The closest approximation to human milk was presented by the specialities of the Würzburger Dampf Molkerei, with casein and albumin 1.11, fat 3.4 to 3.65, and sugar 5.98 to 6.10; and the advertised composition of the "Nutricia" of Hanover, with casein and albumin 1.7, fat 3.35, and sugar 6.2, though the actual percentages found were 1.28, 3.0, and 4.76 respectively. Gärtner's "Fettmilch" contained casein and albumin 1.4 to 1.7, fat 3.1, and sugar 1.88 to 1.99.†

* The more perfect emulsification of the fat noticed by the writers is, I believe, due to the larger proportion of albumin, since I have proved by careful examination of the cream and the separated milk, that practically the whole of the albumin passes over with the fat, the globules of which it invests.—Rep.

† This last analysis must have been made before the addition of milk-sugar, without which Gärtner's process is incomplete. The reporters do not state how the percentage of the nitrogenous constituents of the cow's milk was reduced in any of the products examined, a point of great importance, for if it be by dilution only, the relative proportion of casein and albumin remains the same, whereas in Gärtner's method the diluted milk is passed through a separator revolving at the rate of not more than 600 revolutions in the minute, and the product, "fat milk," is a poor cream containing a large proportion of the albumin

A NOTE ON

THE ANNUAL REPORT ON THE HEALTH OF OLD-
BURY U.S.D., WORCESTERSHIRE, FOR 1898.

By A. CUNNINGHAM, M.B.

WITH A SPECIAL REPORT ON ENTERIC FEVER IN OLDBURY.

By G. H. FOSBROKE, D.P.H.,
County Medical Officer.

THE town of Oldbury in Worcestershire has an estimated population of 25,000. The prevalence of enteric fever in Oldbury has been in excess of the average for the country for the last six years. In August, 1898, the number of notified cases rose from 5 in the previous month to 36, and to 46 in September, falling to 24, 30, and 16 in the succeeding months. The total number of cases for the year was 194, and of deaths 26. This sudden increase severely taxed the energies of the medical officer of health, who has held the office for eighteen years, and is engaged in practice there, as well as of the inspector, Mr. G. H. Robbins. The active measures taken by them in dealing with the individual cases are set forth in detail, concerning which the medical officer says that it was due to the activity and thoroughness with which they were carried out that the disease was checked so successfully. He also reports on the measures taken for the prevention of other diseases. The most interesting feature of the report is a special report to the Sanitary Committee of the Worcestershire C.C. made by the county medical officer, Dr. G. H. Fosbroke. The report gives a terse description of the many sanitary shortcomings of the town, and their special relation to the outbreak. He excludes the water-supply, the milk-supply, and the sewerage as direct causes of the outbreak on apparently sufficient grounds, although the condition of the cowsheds and the sewers is severely animadverted upon. In his opinion, the prevailing mode of excrement disposal was the cause of typhoid fever having been endemic in the past, and of its recent epidemic prevalence. With a sewage outlet and an abundant water-

that goes over with the fat globules, and a minimum of casein in the imperfectly separated milk. The products of complete separation are:

Separated Milk.

All the casein.
All the sugar.

Cream.

All the fat.
All the albumin.

Whereas those of Gärtner's process are:

Poor Milk.

Most of the casein.
Little albumin.
Little fat.
Some sugar.

Rich (Fat) Milk.

A little casein.
Most of the albumin.
Most of the fat.
Some sugar (to which more is added).—*Rep.*

supply there had been no active steps taken to convert the privy-middens, which have been the usual mode of excrement disposal in the Midlands in the past, into water-carriage closets. The inspector supplies a census showing 3,254 privy-middens, and only 328 w.c.'s, 30 slop-closets, and 21 pail-closets. Many of the middens were of the ancient type, planned to be emptied as seldom as possible. The county medical officer quite endorses the opinion of Dr. Cunningham that the investigations pointed "to soil emanations, the result of the hot, dry season, and the use in large yards of common privy accommodation, as the cause of the outbreak, as well as the want of proper precautions by the occupants of infected houses." It is remarkable, but not specially noted in the report, that with all the conditions present which usually accompany a high diarrhoeal mortality, including a birth-rate of 38 and an infantile mortality of 233, there were only 13 deaths among children from diarrhoea, the diarrhoea death-rate for 1898 being 0.6. Among the recommendations made, the most obvious and necessary is the gradual replacing of the privy-middens with water-closets. This, however, is one of the most difficult sanitary problems which most inland Local Authorities now have to deal with. The reports of medical officers of health are quite monotonous on the subject, but the usual course is to proceed along the lines of least resistance. The reports which have been published in this Journal of the appeal cases from Widnes, Eccles, and other places show that middens are lawfully established and privileged institutions, that they cannot be dealt with arbitrarily or in wholesale fashion, and that special provisional orders have been obtained by several towns to enable them to borrow money to repay the cost of their conversion. As an example of the terms of such an Order, the following extracts are given from the Wolverhampton Order:

Local Government Board's Provisional Orders Confirmation
(No. 19) Act, 1896.

BOROUGH OF WOLVERHAMPTON.

"ART. IV.—(1) When a sewer and water supply sufficient for the purpose are reasonably available, the Corporation may from time to time, by written notice to the owner or owners of any building, require any existing closet accommodation (other than a water-closet or a waste-water-closet) provided at or in connection with such building, to be altered so as to be converted into a water-closet or waste-water-closet, which shall comply with the by-laws for the time being in force and shall communicate with a sewer; and they may also require a separate receptacle for ashes and house refuse to be provided at or in connection with such building.

"(2) If the owner or owners of any such building fail in any respect to comply with a notice from the Corporation (under subdivision (1) of this Article), the Corporation may at the expiration of a time to be specified in the notice (not being less than fourteen days after the service of the notice) do the work specified in such notice; and may recover in a summary manner from the owner or owners the expenses incurred by the Corporation in so doing:

"Provided that, if in any case such alteration shall be required in respect of any existing closet accommodation which prior to the service of the notice under subdivision (1) of this Article shall not have been certified by the medical officer of health to be sufficient for the necessities

of the inhabitants of the building, nor to be in such a state as to create a nuisance or to be injurious to health, then the cost of providing and laying the drain and of connecting the same with the sewer and of fixing the water-closet or waste-water-closet, as the case may be, shall be borne by the Corporation, and the remainder of the said expenses shall be borne by the owner.

"(3) The Corporation may contribute towards the expenses incurred in making any alteration of any closet accommodation in pursuance of this Article, in any case in which they may not be required to bear any part of such expense.

"ART. X.—The Corporation may with the sanction of the Local Government Board, and subject to the provisions of this Order, borrow on the security of the Improvement Fund and Improvement Rate of the Borough such sums not exceeding in the whole the sum of thirty-five thousand pounds as may from time to time be necessary for the purpose of defraying any expenditure of the Corporation in pursuance of subdivisions (2) and (3) of Article IV. of this Order."

There is nothing very exceptional or novel about the unsanitary conditions of Oldbury except that it has lagged behind other towns, nor in the persistence and active recrudescence of enteric fever by which they have been attended. The occasion affords, however, an admirable illustration—one which deserves to be recorded—of the part which a county medical officer of health is able to take in a special outbreak of disease in his county, acting with the approval of his council and the sanitary authority, and of intervening to advise, assist, and support the sanitary reforms which are needed. He can so well supplement the shortcomings without detracting from the advantages of the position of a medical officer of health in the smaller towns who is also in practice. Without friction and with *entente cordiale* he can speak and act independently. The history of this inquiry emphasises the duty of county councils to appoint medical officers, and demonstrates the nature of the services that officer is able to render in exceptional and difficult circumstances to the Sanitary Authorities within the county area.

THE BACTERIOLOGY OF SCARLET FEVER.

THAT the germ of this disease is a streptococcus, or one of the micrococci swarming in the urine of persons suffering or convalescing therefrom, and not otherwise, all are agreed; but the failure of every attempt hitherto to obtain from the desquamated epithelial scales any cultures distinguishable from such as would follow the mere contact of the living hand with the medium has been a grave stumbling-block in the way of identifying the organism. If there be any truth in the universal belief in the infectivity of the cast-off epithelium, it is in it, after the throat, that the microbe should be found. Some persons, realizing the difficulty, have gone so far as to accept the logical conclusion of denying the communication of the infection by "peeling," which they suggest is a mere coincidence—a phenomenon synchronous with the elimination of the microbes through the naso-pharyngeal mucus and the urine.

Dr. W. J. Class* ascribes the want of success that has attended even

* *Chicago Medical Recorder*, 1899, p. 373.

the latest efforts of Klein, Crajkowski, and others, to their not having employed the appropriate medium for the culture. After numerous failures, he found that he was able, in no fewer than thirty cases of scarlet fever, to cultivate from the scales a microbe identical with that present in the pharyngeal mucus by using a culture medium of glycerine agar, to which 5 per cent. of garden soil, sterilized by repeated intermittent heating, had been added. No growth took place in bouillon, or on potatoes, gelatine, agar-agar, or even glycerine agar, without the admixture of earth. The organisms appeared to grow in milk, but did not alter the sensible character of the fluid.

The microbe was also found in the throats of persons, more or less insusceptible, who, during continued exposure to infection, suffered from some degree of angina, though not showing any eruption; and in the throats of children, members of infected families, who, at the time apparently well, subsequently developed the disease. Rabbits and guinea-pigs resisted every method of inoculation.

The microbe itself is a diplococcus resembling, but greater than, the gonococcus; varying in size, but always considerably larger than the ordinary microbes of pus. The characteristic appearance is best seen in slightly-stained cover-glass preparations made from fresh cultures; these show a transverse line across each half of the organism, giving it the aspect of a tetracoccus. It occasionally occurs as single cocci, or in short chains resembling streptococci. They are not sporiferous. Specimens from fresh cultures take the colour of methylene blue, carbol fuchsin, Bismark brown, and Pitfield's flagella stain in watery solutions very well, and may be decolourized by Gram's method, though not completely.

While Dr. Class has vindicated the popular belief in the danger of peeling, and the necessity for the destruction of the cast-off epithelium, as well as for the disinfection of the urine, his observations do not justify a return to the old exclusive attention to the desquamation, the completion of which is no evidence of the cessation of infection, since the microbes persist in the throat for weeks after the skin has entirely recovered its normal characters, and the saliva and mucus, commonly spoken of as "the breath," constitute the great vehicle or means of spreading the infection.

REVIEW OF RECENT BACTERIOLOGY.

INFECTIVITY OF THE URINE IN ENTERIC FEVER.—M. W. Richardson, in a paper* on the value of urotropin as a urinary disinfectant, gives the result of an examination of the urine of patients in early convalescence after enteric fever. Altogether 190 samples of urine from sixty-six such cases were examined. Of these cases fourteen showed the presence of *Bacillus typhosus* in the urine.* In a previous series of cases, published by the same author,† the specific bacillus was present in the urine of nine out of thirty-eight cases examined during the more acute stage of the disease. A remarkable case is quoted of a man who was admitted into the Johns Hopkins Hospital with cystitis, having had trouble with his urine ever since his discharge from the same hospital five years previously, after an attack of enteric fever. On his readmission a pure

* *Journal of Experimental Medicine*, 1899, vol. iv., No. 1.

† *Ibid.*, 1898, vol. iii.

culture of *Bacillus typhosus* was obtained from his urine. This case is an exceptional one, but quite a number of others have been recorded in which the presence of the bacillus could be demonstrated weeks, and even months, after an attack of enteric fever. Richardson confirms Horton Smith's observation that the bacilli may be so numerous present as to cause a distinct turbidity of freshly-passed urine.

PRESENCE OF BACILLUS TYPHOSUS IN THE CUTANEOUS LESIONS OF ENTERIC FEVER.—Neufeld* examined the serum and blood obtained by puncture of the "rose spots" in cases of enteric fever. Special precautions were taken to obviate fallacies arising from the bactericidal influence of the patient's blood. The method adopted was as follows: The skin was thoroughly disinfected, first with alcohol, then with ether; a puncture was quickly made with a lancet, and before any blood had appeared the serous exudate from the wound was taken up on the edge of the lancet and inoculated into peptone broth tubes. Then a few drops of peptone broth were rapidly mixed on the skin with the drop of blood which next appeared, and from the diluted blood other tubes of peptone broth were inoculated. Adopting this procedure, Neufeld was able to demonstrate the presence of the bacillus in thirteen out of fourteen cases examined.

THE BACTERIOLOGICAL EXAMINATION OF THE BLOOD.—Franklin Whitet deals with the question of the value of the examination of the blood in different diseases. The older method of using a few drops of blood, obtained by pricking the finger, has proved unsatisfactory because the micro-organisms present in the blood are usually so few in number that the cultures have generally failed to demonstrate their presence, and the danger of contamination by bacteria of the skin is considerable. The method now practised of culture from a considerable quantity of blood obtained from a superficial vein by means of a sterilized hypodermic needle has the advantage of furnishing a satisfactory quantity of blood for culture experiments, and of obviating any risk of external contamination. The blood from ninety-two cases was examined. In every case 5 c.c. of blood were drawn off with a syringe, and .5 c.c. was added to each of the peptone broth and (eight) agar tubes. Four agar tubes were slanted, and four were utilized as plate-cultures. Eighteen cases of surgical "sepsis," all of which proved fatal, were examined. Bacteria were found in the blood of four of these, *Streptococcus pyogenes* in pure culture three times, and *Staphylococcus pyogenes aureus* in pure culture once. Nineteen cases of pneumonia, ten of which proved fatal, were similarly examined. The pneumococcus was obtained in pure culture in three of the cases, and in each of the three cases the patient died. Eight cases of cerebro-spinal meningitis were examined, and in all the blood was sterile. The blood from thirty-seven cases of severe chronic disease (carcinoma, sarcoma, cardiac and renal disease, tuberculosis, gastric ulcers, etc.) was examined, and in five of them bacteria were found one or more days before death. *Streptococcus pyogenes* was isolated in two cases of chronic nephritis and in one case of Pott's disease with chronic nephritis; *Staphylococcus pyogenes* was found in one case of gastric ulcer and in one of myocarditis and pericarditis. It is noted that in each of these cases the invasion of the blood by bacteria was followed within a few days by death. Cultures from the heart-blood were made immediately after death in thirty-five cases in which no infection could be demonstrated during life. The cases were: seven

* *Zeitschrift für Hygiene*, 1899, vol. xxx., No. 8.

† *Journal of the Boston Society of Medical Sciences*, 1899, vol. iii., No. 7.

of "septicæmia," five of cerebro-spinal meningitis, sixteen of various chronic diseases, and seven of various acute diseases. Four of the cultivation experiments gave positive results, *Streptococcus pyogenes* being found in a case of cancer of the epiglottis, and one of compound fracture of the skull, *Staphylococcus pyogenes aureus* in a case of mitral and aortic stenosis, and in another of mitral regurgitation.

THE DECOMPOSITION OF BUILDING CEMENT BY BACTERIAL ACTION.—The influence of bacterial action in the destruction of cement which has been exposed to the action of water has been investigated by Stutzer and Hartlieb,* and by Geog Barth.† The former writers suggest that the decomposition of cement exposed to the action of water may be due not only to the action of dissolved carbonic acid, but partly to nitrifying bacteria. The residue of a cement which had been thus exposed for a long time was washed with sterilized water, and then added to a solution of ammonium sulphate. The presence of nitrifying bacteria was demonstrated by the appearance of nitrites in the flask after six days, whilst within fourteen days all the ammonia had disappeared. Asparagin in the same way was oxidized to nitrite, and sodium nitrite to the nitrate. Barth examined a cement which had been exposed to the action of drinking-water in a reservoir for three years, and found that the amount of calcium oxide present was only 24.23 per cent., as compared with 63 per cent. in the original Portland cement.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

February 8th and 9th, 1899.

BEFORE LAWRENCE AND CHANNELL, J.J.

ROBINSON v. MAYOR AND CORPORATION OF SUNDERLAND.

Local Government—Domestic Sanitary Arrangements—Local Authority's Notice of Insufficiency—Application to Enter Premises—Justices' Jurisdiction to Entertain Evidence of Sufficiency of Existing Arrangements—Public Health Act, 1875 (38 and 39 Vic., cap. 55), Sections 36, 268, and 305.

Upon an application by a local authority to a Court of summary jurisdiction, under Section 305 of the Public Health Act, 1875, for an order entitling them to enter a house and substitute a new water-closet in lieu of the existing sanitary arrangements—their notice under Section 36 not having been complied with, and permission to enter having been refused by the owner—Justices are not entitled, at the hearing, to review such notice, nor to receive evidence on the part of the owner as to the sufficiency of the existing sanitary arrangements.

The only appeal from an order of a local authority under Section 36 is to the Local Government Board under Section 268.

Case stated at the instance of the owner of a house, by Justices, who had made an order under Section 305 of the Public Health Act, 1875,

* *Zeit. Angew. Chem.*, 1899, 402, through *Journal of Chem. Soc.* † *Ibid.*, 489.

authorizing a local authority to enter, examine, and lay open the house for the purpose of the Act.

The authority had served a written notice dated March 30th, 1898, upon the appellant, the owner of the house, under Section 36 of the Act, requiring him within twenty-eight days from such service to provide a sufficient water-closet and an ashpit, furnished with proper doors and coverings, to the house, founded upon the report of their inspector of nuisances dated March 17th, 1898, that the house required them. The notice not having been complied with, the authority on April 28th ordered that the works specified be executed by the authority, and it became necessary for the authority to enter, examine, and lay open the house for making plans, surveys, and measurements, and executing the works.

On August 18th the borough surveyor applied to the appellant, as such owner, for permission to the authority to enter the house for these purposes. Permission was refused, and on August 19th notice in writing was given to the owner that the authority would apply to the Justices sitting as a Court of summary jurisdiction in the borough for an order authorizing the authority in that behalf.

A summons was issued under Section 305, upon the hearing of which the report of the inspector was proved; also that the appellant was the owner of the house; that the notice of March 30th was served and not complied with; that the works had been ordered by the authority, and it was necessary to lay open the house for their execution; that the appellant's permission had been applied for and refused; and that notice of application to a Court of summary jurisdiction had been served.

The appellant tendered evidence as to the condition of the house, and the sufficiency of a privy and ashpit there.

The respondents objected to the admission of such evidence on the ground that the question of the sufficiency of the privy and ashpit was a matter to be decided by the local authority under Section 36, subject only to an appeal to the Local Government Board under Section 268; and that the local authority having jurisdiction under Section 36 to give the notice in question, the Justices could not review such notice and were not entitled to receive evidence as to the sufficiency of the privy and ashpit. On their behalf *St. Luke's Vestry v. Lewis* [1862],* *Bogle v. Sherborne Local Board* [1880],† and *Whitchurch, Ex parte* [1881],‡ were cited.

The Justices were of opinion that they were not entitled to review the decision of the local authority as to the sufficiency of the privy and ashpit, and declined to hear evidence thereon.

The question for the Court was whether they were right in refusing to receive the evidence tendered by the appellant as to the sufficiency of the privy and ashpit on the premises.

Scott Fox, Q.C., and Adair Roche, for the appellant.—The Justices were wrong in refusing to hear the appellant's evidence. Section 36 is in its terms an empowering section, and casts a duty on the local authority. They may serve notice on the owner or the occupier of the house, who may act on it, but if it be not acted on, the authority may enter and do the work. Section 305 was introduced to meet the difficulty of the authority being trespassers when entering on premises for the purposes of the Act. Under it they may apply to a Court of summary jurisdiction

* 31 L. J., M.C., 73.

† 46 J. P., 675.

‡ 50 L. J., M.C., 41; 6 Q.B.D., 545.

tion for an order authorizing them to enter and lay open the premises; and if no sufficient cause be shown against such application, the order may be made. That then is the opportunity for the person who objects to the entrance into his premises, and who is prepared to prove the sufficiency of his water-closet or privy, to do so. Sufficient cause against the application is shown by proving the sufficiency of the existing arrangements, and that to carry out the works in compliance with the order under Section 36 would be unreasonable. Were this otherwise, no one would be able to prevent injury and structural alteration to his property; and a local authority could always enter without any justification and perform what works they chose. Justices have a discretion when dealing with nuisances under Section 96 and the following sections, and they must have a similar discretion under Section 305. Although Section 36 empowers the authority to give the notice, yet, upon non-compliance, it does not empower them to enter and lay open premises without the owner or occupier being heard—*Cooper v. Wandsworth Board of Works* [1863].* If there were an appeal given from the order of the local authority under Section 36 to the Local Government Board the difficulty would be got over. But the appeal to the Local Government Board under Section 268 is only in cases where all the mischief has been done and the work completed, and where the local authority have obtained an order in a summary way to recover the expenses. This being so, it is manifestly unreasonable that the owner should have no opportunity under Section 305 of proving to the Justices the sufficiency of his sanitary arrangements as they exist.

Atkinson, Q.C., and H. F. Manisty, for the respondents.—The words of the statute are not so wide as suggested. Section 305 is mere machinery for carrying into effect the duties of the local authority. Under that section the Justices cannot review the order of the local authority; their duties are merely ministerial. *Cooper v. Wandsworth Board of Works*† is distinguishable, for in that case no opportunity was given to the person whose house was demolished of knowing what was going to be done, but here the appellant knew what was going to be done as soon as he was served with the order under Section 36. Here the only question for the Justices was whether that order had been made, and whether it had been disobeyed—*St. James's, Clerkenwell (Vestry) v. Feary* [1890].‡ *Hargreaves v. Taylor* [1863]§ is a direct authority upon a similar point under Section 129 of the Public Health Act, 1848. *Bogle v. Sherborne Local Board*|| is valuable on account of the decision of Lush, J., and *Wood v. Widnes Corporation* [1898]¶ for the dictum of the Lord Chancellor, as reported at p. 782 of the *Law Times Reports*, that such a decision of a local authority cannot be brought before a Court of law; the remedy of the person who thinks himself aggrieved being by appeal under Section 268 to the Local Government Board. As to the contention that the owner shall have an opportunity to be heard, see *Att.-Gen. v. Hooper* [1893].**

Scott Fox, Q.C., replied.

LAWRANCE, J.—I think the Justices came to a right conclusion. The

* 32 L. J., C.P., 185; 14 C. B. (N.S.), 180.

† *Ibid.*

‡ 59 L. J., M.C., 82; 24 Q.B.D., 703.

§ 32 L. J., M.C., 111; 3 B. and S., 613.

|| 46 J. P., 675.

¶ 67 L. J., Q.B., 254; 77 L. T., 779.

** 63 L. J., Ch., 18; [1893] 3 Ch., 493.

whole difficulty has been in deciding what is meant by the words "sufficient cause" in Section 305 of the Act of 1875. It is argued on the one side that sufficient cause there is shown before the Justices when an order is required for the purpose of going upon the premises after the order has been made by the local authority under Section 36. The commencement of the whole proceedings seems to be under Section 36, which says that if it appear to the local authority, by the report of their surveyor or inspector of nuisances, that a house—which is the case here—is without a sufficient water-closet, they shall, by written notice, require the owner to provide it. Then the point arises whether the question whether the water-closet is sufficient or not can be entertained by the Justices when they are asked for an order, under Section 305, by the local authority, to go upon the premises for the purpose of putting the premises into a sanitary condition. It seems clear that that cannot be, and that Justices have no power whatever, on such an application under Section 305, to entertain evidence of the owner as to the sufficiency of the existing sanitary arrangements. The order having been made under Section 36, it having appeared to the local authority, from the report of their surveyor, that the premises are in an unsanitary condition, it is not for the Justices to enter into the question at all whether that is so or not. It would not be difficult to find many instances in which effect might be given to the words "sufficient cause." Supposing the order was so given upon the face of it; supposing they could show that there was no report from the surveyor or inspector, or anything of that kind, I apprehend that would be a case in point. That is what the local authority have to satisfy the Justices of before they are entitled to an order. I suppose that might be one of the questions which might be fitly taken before the Justices for the purpose of showing that no such order might be made. There are plenty of other reasons that might be given. One which suggests itself to me is this: The owner might say, "Well, I have nothing to say to the thing itself—the doing of the work; but my family are all ill at the present moment, and it would be fatal to them to have the drains taken up at the present time." And there are other temporary matters of that kind. But I do not think any case has been cited to us to show—indeed, I think the whole authority is the other way—that the Justices are to enter into the question of the validity of the order itself. That is to say, if the order is correct in itself, and sufficient in itself as to whether the premises are or are not in a proper state, the decision rests entirely with the local authority, by their surveyor or inspector; and when once that decision is arrived at, I think the Justices have no power to enter into the matter at all.

The only point in this case was that what was attempted to be done here was to dispute the question whether the water-closet was in a fit condition or not. In my judgment the Justices were right in rejecting that evidence, and I think they had no right, under Section 305, to entertain the matter at all.

It is said it is a case of hardship that there is no appeal. It is quite true there is no appeal, except under Section 268. If the work be done by the local authority, and the local authority then attempts to enforce the payment of the money, it seems under Section 268 that the whole matter is open as to the necessity for the work that may have been done, the manner in which it has been done, and so forth; and ample power is given to the Local Government Board to consider and to award to the person who has been aggrieved compensation for the

loss, damage, or grievance sustained by him. It seems to me that is the only appeal given by the statute. Section 305 was not intended to give an appeal from the local authority to the Justices, and the Justices were right in declining to hear the evidence that was tendered.

CHANNELL, J.—I also think that the Justices were right, and that they had no power to enter into the question of the sufficiency of the water-closet or privy.

The question turns upon the true construction of Section 305. I think that is a section for the purpose of providing machinery under which the local authority can enter upon premises under an alleged statutory right. The words of the section are, "Whenever it becomes necessary for a local authority to enter, examine, or lay open any lands or premises" for such and such purposes, in this particular case "for the purpose of making . . . works." I think the section may be read thus: "Whenever it becomes necessary for a local authority to enter into premises for the purpose of doing works which they have a statutory right to do." That, I think, is the most that can be read into it in favour of the appellant in the present case. Supposing that be read into it, the result is that the Justices who have to inquire whether the preliminary matter in this section has been complied with—that is to say, whether it is a case where it has become necessary for the local authority to enter for the purpose of doing works which they have a right to do—may inquire into the necessity of the entry, and may inquire into the purpose of entry to see whether it is for the purpose of doing something which comes within the following words: "Making plans, surveying," and so on; that is, in substance, to inquire whether it is for the purpose of doing works which they have a statutory authority to do. So far the Justices may inquire into the matter. And the section goes on to say, "if no sufficient cause is shown," because the Justices must be told for what purpose the local authority want to enter in each particular case. Turning to the case before us, the particular works the local authority have in view are the making, in the place of privies or water-closets, which they have considered insufficient, similar constructions which they consider sufficient. The question of their right to do that depends upon Section 36, which is framed in the same way as a good many of these sections are framed. It provides that if a house "appear to such authority by the report of their surveyor or inspector of nuisances to be without a sufficient water-closet," and so on. The introduction of the words "appear . . . to be" is obviously for the purpose of making the local authority the Judge. The power to put a new water-closet into a house under this section does not depend on the existing water-closet being in fact insufficient, but upon the opinion of the local authority after reading the report of their surveyor that it is insufficient. Consequently, as the right does not depend on the sufficiency or insufficiency of the sanitary arrangements, but upon the opinion of the local authority on the point, it cannot possibly (subject to the question as to the notice raised by the counsel for the appellant with which I will deal) be a matter for the Justices whether the water-closet is sufficient or insufficient. What they have to inquire into in the matter is whether it is "in the opinion of the local authority insufficient." But it may be that they may also have to inquire—as on the whole I am inclined to think they have—whether the local authority have taken the proper procedure; whether they have done everything which the statute has made a condition precedent to their executing the works. I think, though I do not know

whether it is at all necessary for us to decide it, that if it appeared to the Justices that the local authority had made an order upon a person to provide a sufficient water-closet, without having a report of their surveyor that the existing water-closet was insufficient, such an order would not do. *Lewis v. Weston-super-Mare Local Board* [1888],* before Mr. Justice Stirling, was a case upon a very similar clause to this, about doing a thing on a report of a surveyor, in which that Judge held that the surveyor must be the real surveyor of the Board—a person in a responsible position—and that it was not sufficient to have a report of a mere *locum tenens* who was doing the work of the surveyor temporarily or during his absence. I think in that case it was entering for the purpose of making a sewer, and the Judge held that the condition precedent had not been performed. Something of that sort might be a matter which the Justices might inquire into. If that be so, equally if this statute has got imported into it by implication that which counsel for the appellant contends—namely, an obligation on the local authority to hear the person before they make an order upon him to make a sufficient water-closet, it may be that the Justices might have a right to inquire into that—not to hear the person themselves upon the question of insufficiency—but to let him contend that the order made on him was invalid because he had not been heard before it was made. If there is such a condition precedent to be read into the statute, the non-compliance with it would be much the same as failing to get a report of the surveyor in the first instance. Consequently, if the appellant could show that he had raised some such point as to a condition precedent, and that the Justices had declined to hear him upon it, I think he would be entitled to complain. But, so far as I can see in this case, he never did raise any such point at all before the Justices. It is, however, a point upon which I think it is right to say a word or two, independently of the question whether in point of fact it is raised formally in this case. In my opinion, the principle of *Cooper v. Wandsworth Board of Works*† does not apply to such a matter as this. There the Wandsworth Board of Works assumed to pull the man's house down, which they had no right to do except for the reason that he had failed to give them a certain notice. They began to demolish his house without having told him they thought he had not given them any notice. He asserted subsequently that he had sent a notice, and that if the local board had not received it, it must have miscarried; and, if the action of the local authority there had been justified, the house would have been pulled down without his having an opportunity of telling them that he had, in fact, sent off that notice. The Court said that that was contrary to natural justice. They proceeded upon principles of natural justice, but they never said it was necessary to have a formal hearing. They never said that Cooper was entitled to come by counsel to have a formal hearing. He did not know what was alleged against him, and he was entitled to have some opportunity of being heard, and of saying that he had made no default.

In this case the procedure is totally different from that. Here, first of all, there is to be a report of a surveyor; and although it is suggested that it may be—and I do not say it is absolutely impossible—that a surveyor may make a report upon mere hearsay and without going into the premises, it is in the highest degree unlikely, and therefore in all probability at the first stage the man would know that there was

* 58 L. J., Ch. 39; 40 Ch. D., 55.

† 32 L. J., C.P., 185; 14 C.B. (N.S.), 180.

some question about the sufficiency of his water-closet. But even if he did not know then, the order has to be made upon him and to be served upon him to furnish the proper water-closet, and he then knows what is going on. And even then it is not very much use his saying that in his opinion it is a very good water-closet indeed, nor calling any number of experts and people to say that it is, because the governing thing is not the insufficiency of the water-closet itself, but the opinion of the local authority that it is insufficient. Consequently it really is not a case where a hearing is wanted for any practical purpose. It is quite sufficient that he should have notice of the proceedings, and this it seems to me he necessarily has. That is my view of that matter, but I do not myself think that the point made by counsel is in fact raised in the case. I think that the only point really raised in this case is whether the Justices had power to consider, upon this application, whether the water-closet was sufficient or insufficient; and I am quite clear that they had no such power at all. The consideration of the sufficiency is a matter entirely for the local authority, subject, of course, ultimately to the appeal to the Local Government Board under Section 268. If that tribunal think that the water-closet was sufficient and the work done by the local authority unnecessary, the result will be that the authority will have done at the public expense, and not at the individual expense of the appellant, something which they thought was an improvement, but which the Local Government Board does not; and the ratepayers of the district will have to pay for this improvement.

I am quite clear that the Justices came to a right conclusion, and that this appeal must be dismissed.

Judgment accordingly.

HIGH COURT OF JUSTICE.

CHANCERY DIVISION.

April 18th, 19th, and 28th.

BEFORE STIRLING, J.

NICHOLL v. EPPING URBAN DISTRICT COUNCIL.

Local Government—Insufficient Privy—Jurisdiction of Local Authority to Require Water-closet—Public Health Act, 1875 (38 and 39 Vic., cap. 55), Section 36.

Under Section 36 of the Public Health Act, 1875, the local authority has power to order the conversion of an insufficient privy into a water-closet.

St. Luke's, Middlesex, Vestry v. Lewis (31 L. J., M.C., 73; 1 B. and S., 865), *applied*.

The plaintiff was the owner of four cottages which were let to tenants and rated at from £3 15s. to £4 each. Each cottage had a privy attached to it.

On May 25th the defendants' inspector made reports to the defendants as to each of these cottages. It appeared that he had considered the case of each cottage separately, and the report as to each was, *mutatis mutandis*, as follows: "In pursuance of Section 36 of the Public Health

Act, 1875, I have the honour to report to you that on the 18th day of May, 1898, I examined the house occupied by Joseph Sells in Hemnal Street, within the said district—the defendants' district—and found that the said house was without a sufficient water-closet, earth-closet, or privy. I therefore recommend that notice be forthwith given to the owner of the said house requiring him within the space of six weeks to provide for the said house a sufficient water-closet.

On the same day each report was read at a meeting of the defendant council, at which the inspector was present and was consulted as to each report.

Thereupon on August 19th the council caused notices to be served on the plaintiff in the following terms: "Take notice that the Urban District Council of Epping, in the county of Essex, being satisfied on the report of their Inspector of Nuisances, dated May 25th, 1898, that the house above-described is without a sufficient water-closet and earth-closet, or privy, hereby require you, in pursuance of the provisions of the Public Health Act, 1875, to provide for the said house within the space of six weeks from the service upon you of this notice a sufficient water-closet. If the above notice is not complied with within the time aforesaid, the Urban Council of Epping may, at the expiration of such time, do the work required to be done, and recover the expenses incurred in so doing in the manner provided by the said Act."

The plaintiff was willing to put the privies into proper order, but not to substitute water-closets; and accordingly, the notices not being complied with, the defendants proceeded, in compliance (as they alleged) with their statutory powers, to do what was necessary as expressed in the notices.

This action was brought by the plaintiff to restrain the defendants from so doing.

The action now came on upon motion for an interlocutory injunction.

Upjohn, Q.C., and *P. F. S. Stokes*, for the plaintiff.—On the construction of Section 36 of the Public Health Act, 1875, the question of sufficiency of accommodation rests with the local authority, and the question of the kind of accommodation with the owner. The Legislature contemplates that privies shall exist—Sections 42 to 44. The elaborate provisions of Section 91, sub-Section 2, for abating a nuisance arising out of privies and punishing the offender would be beside the question if under Section 36 the local authority could do away with privies altogether at its own will. "The Legislature has nowhere condemned the use of the privy system"—*per* Lord Russell of Killowen, C.J., in *Barnet v. Laskey* [1898].* Therefore, the first question is, Has the local authority, acting under Section 36, a power where there is an existing privy to do more than require that it should be sufficient in every respect, and no power to require the owner to substitute a water-closet?

Another question is one of fact. The plaintiff alleges that the local authority is acting under a general plan of doing away with privies altogether, and substituting water-closets. The question of sufficiency is one for the local authority subject to a right of appeal to the Local Government Board—*Wood v. Widnes Corporation* [1898].† The notice in the present case is wrong in that it did not give an option. *Wood v. Widnes Corporation*‡ is a clear authority in the plaintiff's favour on the general question of the construction and equally on the question

all

* 68 L. J., Q.B., 55, 57.

† 67 L. J., Q.B., 254; [1898], 1 Q.B., 468.

‡ *Ibid.*

of fact. The defendants will ask the Court to dispose of the question by reference to a different statute. The language of Section 81 of the Metropolis Management Act, 1855, to which they will refer, is something like that of the Act of 1875. But the authorities on one section only confuse if applied to the other. There have been conflicting opinions on the construction of Section 81—*Tinkler v. Wandsworth Board of Works* [1858],* where Knight-Bruce, L.J., was of opinion that it did not give the local authority power to require a water-closet where there was a privy before, and Turner, L.J., simply assumed that the Act did authorize it, but decided against the local authority on the ground of a general scheme. The defendants will also rely on *St. Luke's, Middlesex, Vestry v. Lewis* [1862].† That decision turned on the discretion of the authority to do one or "either" of the matters specified in the Act of 1855. That is not the language of the Act of 1875, and there is such a difference between the two enactments that the decision is of no assistance. The defendants have therefore exceeded their powers.

Macmorran, Q.C., and *Parkyn*, for the defendants.—When once the local authority have properly determined that the accommodation is insufficient, it is for them to determine what is to be put in its place. If they act oppressively in their requirements the Act gives a right to appeal to the Local Government Board (Section 268), and it is to that Board the question must be referred. The defendants would have no power to give notice in pursuance of any general system for the abolition of privies and the substitution of water-closets. That has never been done since the decision in *Tinkler v. Wandsworth Board of Works*.‡ The clerk to the defendant council knows of no resolution or motion to that effect, and there is no evidence as to any general scheme. The report of the surveyor, on which these proceedings are based, is a detailed one of each of these properties, so it is clear that each case has been considered. The words of the Metropolis Management Act, 1855, and of the Public Health Act, 1875, are exactly the same so far as the requirements are concerned, "to provide a sufficient water-closet (earth-closet) or privy and (an) ashpit, or either of them." In *Wood v. Widnes Corporation*§ the local authority not merely required the substitution of a closet for a privy, but also the substitution of a particular kind of accommodation, and both the Divisional Court and the Court of Appeal held they could not do that. It was not disputed that there was power to require a closet to be substituted for a privy in a proper case. Section 91 has nothing to do with the present question; it has reference to abatement of nuisances and orders of Justices in such cases—*Whitaker v. Derby Urban Authority* [1885].|| The second part of Section 36 of the Act of 1875 is the only respect in which it differs from the corresponding section in the Act of 1855, but the meaning in both cases is the same. This is the first time the point has been raised since *St. Luke's, Middlesex, Vestry v. Lewis*.¶

[They also referred to *Robinson v. Sunderland Corporation* (1898).**]

Upjohn, Q.C., in reply.—The authorities are not of much assistance. The question is one of construction of the Act. *Cur. adv. vult.*

* 27 L. J., Ch., 342; 2 De G. and J., 261.

† 31 L. J., M.C., 73; 1 B. and S., 865.

‡ 27 L. J., Ch., 342; 2 De G. and J., 261.

§ 67 L. J., Q.B., 254; [1898] 1 Q.B., 468.

|| 55 L. J., M.C., 8.

¶ 31 L. J., M.C., 73; 1 B. and S., 865.

** 78 L. T., 194; 62 J. P., 216.

STIRLING, J. (after stating the facts).—It was admitted that the plaintiff cannot in this Court impeach the report of the inspector, and that, if he has any ground of complaint in respect of it, his course is to appeal to the Local Government Board under Section 268 of the Act. Two objections were, upon the motion, raised to the proceedings of the defendants. One was that, it was said, the local authority were acting in pursuance of a general scheme to introduce water-closets in place of privies without exercising a discretion as to the exigencies of each particular case, as is required by the statute. This objection was, however, abandoned, and rightly, in my opinion, not insisted on in the reply. The other objection was that the defendants had no authority to require the plaintiff to provide a water-closet instead of a privy. The determination of that question depends on Section 36 of the Act. [His Lordship read Sections 35 and 36.] It is clear that the Legislature has not prohibited the erection of privies. The question is whether, the inspector having found an existing privy to be insufficient, the local authority have power to require the owner to provide a sufficient water-closet, subject, of course, to his right of appeal to the Local Government Board, similar to that which admittedly exists as to the sufficiency of the existing accommodation. The important words in the section are "or either of them, as the case may require." The plaintiff contends that "or either of them" simply refers to "privy and an ashpit." The defendants say the words extend to the three matters mentioned in the section—namely, water-closet, earth-closet, and privy (and ashpit). In my opinion, looking at the matter of construction, the words "or either of them, as the case may require," have not the narrow meaning contended for by the plaintiff. Reasons were given why I should not deal with the section in what appears to me to be its natural construction. But before I deal with this I will refer to some authorities.

There is no case which is exactly in point, but several have been referred to. *Wood v. Widnes Corporation** has reference to a different issue. In that case the local authority was not content to limit the notice to requiring "a sufficient water-closet," but had called upon the owner to provide a water-closet of a particular kind. It was held that the local authority had exceeded its jurisdiction, and that the owner was entitled to provide any kind of water-closet provided it was sufficient. That, therefore, was a different case from the present one, and the remarks of the Judges who decided that case seem to me to have reference to that case and not to the question which I have to decide. Reference was, however, made to decisions on the provisions of the Metropolis Management Act, 1885, Section 81 of which is in very similar terms to the provisions of the Public Health Act, 1875. It begins by saying that it shall not be lawful to erect any house without a sufficient water-closet or privy and ashpit, and then follows a provision similar to that of Section 36 of the Act of 1875, that, if a house shall be without a sufficient water-closet or privy and ashpit, the local authority shall give notice requiring the provision of a sufficient water-closet or privy and ashpit, "or either of them, as the case may require." These last words are the same as are in Section 36. But the words which follow in the second part of the section are different. They are, that if the notice is not complied with, it shall be lawful for the local authority to cause to be constructed "a sufficient water-closet or privy and ashpit, or either of them, or do such other works as the case may

* 67 L. J., Q.B., 254; [1898] 1 Q.B., 463.

require," and to recover the expenses. That provision has been the subject-matter of two decisions. In *Tinkler v. Wandsworth Board of Works*† Lord Justice Knight-Bruce expressed an opinion that the local authority was not entitled under the Metropolis Management Act to direct what ought to be provided in the place of defective accommodation. He says: "Remarkable as some of the provisions of that Act seem to me to be, I am of opinion that they do not deal with rights of property in such a way as the defendants contend that they do, nor can I find," in the statute, "any warrant for what the defendants have been attempting and now insist on." Lord Justice Turner abstained from expressing an opinion on the point, but gave his decision on the ground that the local authority was acting in pursuance of a general scheme. He says, "Whether this conclusion is well founded and whether the powers given by this Act are such as that no abuse of them could be committed which would warrant the interference of this Court, I do not intend to give any opinion whatever, for the defendants' argument plainly rests on the hypothesis that the case falls within the Act, and I am of opinion that this case does not fall within it." And he bases his judgment, as I have said, on the view that the local authority was acting on a general scheme without exercising a discretion in each particular case. These decisions, therefore, are different from the present case.

The question came before the Court of Queen's Bench, consisting of Chief Justice Cockburn, Mr. Justice Wightman, and Mr. Justice Crompton, in *St. Luke's, Middlesex, Vestry v. Lewis*,† where it was unanimously held that the Metropolis Management Act did confer on the local authority the power which was claimed. All the Judges relied on the latter part of the section in the Act under consideration, which differs from that which I have to consider. But in arriving at their conclusion they lay stress upon the words "or either of them, as the case may require." Chief Justice Cockburn points out reasons why the Legislature may have thought fit to entrust such a power to the local authority. He says: "On the part of the Vestry it is urged that they were right in holding that the privies attached to these houses were insufficient: while the contention of the respondent is, that although the Vestry might have directed him to alter those privies so as to make them sufficient, they could not order water-closets to be put up in the place of them. I do not see that such is the necessary effect of the language of the Act: quite the contrary. Power is given to the Vestry, etc., to cause to be constructed a sufficient water-closet or privy, 'or either of them'; which last words seem very strong to show that if the fact is once established that there is an insufficient privy, they are to have authority to order a water-closet or privy in the alternative." The two other Judges say the same. The Chief Justice goes on to give reasons why it is right and proper that such power should be vested in the local authority. The abuse of such a power, it will be remembered, is guarded against by the right of appeal to the Local Government Board.

Before me the point was relied on that I ought not to act upon the view of the defendants, because to do so would be to interfere with rights of property. That consideration must be regarded. In *St. Luke's, Middlesex, Vestry v. Lewis*† Chief Justice Cockburn points out why the fact of such interference should not deter the Court from giving effect

* 27 L. J., Ch., 342; 2 De G. and J., 261.

† 31 L. J., M.C., 73; 1 B. and S., 865. ‡ *Ibid.*

to the words at the end of the clause in the Act of 1855. Although the language of the Public Health Act differs from that of the Metropolis Management Act, if under Section 36 of the former Act notice is given in the exact words of the section—that is, “to provide a sufficient water-closet, earth-closet or privy, and an ashpit, or either of them”—still the power which is given to the local authority is to do the work by the notice “required to be done,” so that the discretion as to the precise work to be executed would ultimately rest with the local authority. It could not be contended that the local authority, having given the notice in that form, would not be entitled to do the work in such way as they might think fit. It was also said against the view of the law contended for by the defendants that, if the owner provided accommodation in accordance with Section 35, he might in a year or so, or less, be compelled under Section 36 to provide accommodation in accordance with that section. This, however, could only happen in one of two events—either on the local authority finding the accommodation provided to be insufficient, or that the circumstances of the case required another kind of accommodation. In either case the owner would have his right of appeal to the Local Government Board.

On the whole, although the enactment of the Public Health Act is not so clear as that of the Metropolis Management Act, I think the language is sufficiently so; and I accordingly hold that the Vestry has the authority which it claims, and the motion therefore fails.

REVIEW.

ENTERIC FEVER AT ILKESTON. Report of Dr. S. W. Wheaton to the Local Government Board on enteric fever in the Ilkeston Registration District. London: Eyre and Spottiswoode, 1899. Price 3d.

Between Nottingham and Chesterfield the country is thickly dotted with villages, many of them of considerable size, and most of them in the vicinity of coalpits. Coal is discovered, and with considerable rapidity houses are built to accommodate the men employed in getting it up. Little supervision appears to be exercised, but as ground space is fairly plentiful, there is a piece of land attached to each house or to two or more in common. At first a couple of holes are dug, one to serve as a well, the other as a cesspool; but later on a company steps in, and water is laid on to the houses from one or other of the rivers, from deep wells or disused pits, and sometimes a supply is obtained by utilizing the water pumped from outside the casing of pit-shafts. When these are not available and the shallow wells give out, the inhabitants have either to get river or canal-water for themselves, or use rain-water which they have previously collected. (Heanor District Council insist on the provision of rain-water tanks for all new houses.) The shallow wells receive the soakage from the uncemented cess-pits, but until these become infected with the specific organism, those using the water may remain safe. When river-water is introduced, however, greater risks are run, as a much greater area is provided from which pollution may occur.

This may be considerable in amount, as Dr. Wheaton shows. The main source of supply for Ilkeston borough is taken from the Nutbrook, which derives its water from three sources, viz., Stanley Brook, Mapperley Brook, and the Nutbrook Canal. Stanley Brook has a hamlet

on its banks, with midden privies built directly abutting on the stream, which also receives all the household refuse, liquid or solid. Falling into it are some small streams similarly polluted. The Mapperley Brook starts from a pond situated on waste ground, which receives the contents of the middens in the neighbourhood; this brook also receives liquid refuse in its course, and has a very foul appearance. Half a mile above the point where the Stanley Brook joins the Nutbrook is the terminal basin of the canal, and the Nutbrook is at first merely the overflow water from this basin. The sources of the water in the canal are traceable to two streams which rise near Heanor. One receives the very impure effluent from a sewage-farm (so called) and other liquid refuse, the other is not in much better condition. The fields also through which these streams run are in some instances manured with the contents of privies. From the above account it will be seen that it is hardly possible to imagine a more dangerous and disgusting source of water than the Nutbrook. Yet such is the water supplied from the Ilkeston Public Water Works, after a certain amount of filtration. At Heanor, to which allusion has been made, enteric fever has been prevalent for some time, and the greater part of the sewage of the town passes unaltered into the feeders of the Nutbrook. It cannot be a matter for surprise, therefore, that Ilkeston has not been free from enteric fever for many years. Since notification came into force in 1893 there have been 448 cases with 67 deaths in a population of from 20,000 to 25,000 persons. A spot map shows that to whatever locality the water from the mains has been carried, there fever may be found. At Heanor Dr. Wheaton found such a multiplicity of unwholesome conditions that it was almost impossible to come to a definite conclusion as to the way in which the fever was spread there, but he had strong reason to suspect that certain wells had become infected, and he also considers it highly probable that the poison multiplied in infected sewers and house-drains, and from these had spread through leakage into the soil in the neighbourhood of dwellings. It is evident from the above account that prompt action is required to improve the water-supply, and to properly purify the sewage of this district. From the undulating levels, the subsidence of soil through extensive coal-workings and other causes, it is doubtless difficult to carry out schemes of sewerage, but it is not impossible, as is shown by the introduction of effective systems in various parts of the district.

Hospital accommodation in Ilkeston appears to be scanty, as only thirty-seven persons were admitted to the isolation hospitals in 1898, and these were mostly persons in an advanced stage of the disease.

APPOINTMENTS.

Acton, F. C., M.B., appointed M.O.H. of Yackandandahshire, Victoria.
 Altmann, C. A., M.B., appointed M.O.H. of Brightshire, Victoria.
 Body, H. M., M.R.C.S., reappointed M.O.H. of Crediton (Devon) U.D.C.
 Buxton, E., M.D., appointed M.O.H. of Little Crosby and Hightown R.D.C.'s.
 Forbes, W. G., M.B., appointed M.O.H. of Knaresborough R.D.C.
 Fraser, P., M.D., reappointed M.O.H. of Llanrwst U.D.C.
 Garland, E. C., L.R.C.P., reappointed M.O.H. of Yeovil U.D.C.
 Giles, C., L.R.C.P., reappointed M.O.H. of Sleaford U.D.C.
 Gorringe, C. J., M.B., appointed M.O.H. of Green Ponds, Tasmania.

Harding, C. H., L.R.C.P., reappointed M.O.H. of Whittlesea U.D.C.
 Huey, J. J., L.S.A., appointed M.O.H. of Mexborough U.D.C.
 Jukes, G., L.R.C.P., appointed M.O.H. of Longridge U.D.C.
 Lamplough, C., M.D., reappointed M.O.H. of Chatteris U.D.C.
 Maclean, R., L.R.C.P., appointed M.O.H. of Lawtostshire, Victoria.
 Mason, W., M.R.C.S., appointed M.O.H. of Meredithshire, Victoria.
 Moore, H. C., M.R.C.S., appointed M.O.H. of Hereford M.B.
 Oliver, C. P., M.D., appointed M.O.H. of Maidstone M.B.
 Park, J. S., L.R.C.P., appointed M.O.H. of Cranbourneshire, Victoria.
 Parkinson, C. H. W., M.R.C.S., reappointed M.O.H. of Wimborne R.D.C.
 Patterson, J. H., M.B., appointed M.O.H. of Traralgonshire and Toongabbie Riding, Roosedaleshire, Victoria.
 Peipers, F., M.D., appointed M.O.H. of Wodongashire, Victoria.
 Pern, A., L.R.C.P., reappointed M.O.H. of South Stoneham D.C.
 Reynolds, F. M., M.B., reappointed M.O.H. of Ottery St. Mary (Devon) R.D.C.
 Scatterty, W., M.D., appointed M.O. of School Board, Keighley.
 Senior, R., M.B., reappointed M.O.H. of Esher and Ditton U.D.C.'s.
 Smith, W. R., M.B., appointed President of Central Board of Health, South Australia.
 Sprott, G., M.D., appointed M.O.H. of District of Beltana, Tasmania.
 Tuxford, A., M.D., reappointed M.O.H. of Boston M.B.
 Webb, A. B., M.B., appointed M.O.H. of Ballanshire, Victoria.
 Young, R., M.D., reappointed M.O.H. of Royton D.C.

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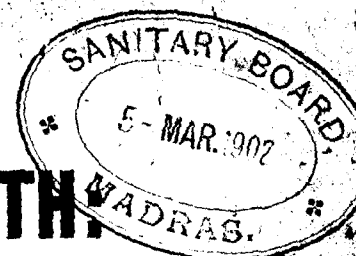
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EDITORIAL.

LANDLORDS' LIABILITIES FOR SANITARY CONDITION OF THEIR HOUSES.

THERE can be no question that the letting of any premises for human occupation should imply that such premises are in a good sanitary state. This need not mean that the sanitary fittings, using the term in its widest sense, and not restricting it to drains *et hoc genus omne*, were of the most recent pattern or included the latest fad, but that the premises were in such a condition that no nuisance or danger to health was at the date of letting existent thereon. This was really the aim of the Bill for the Registration of Houses which was before Parliament for two or three sessions a few years back. As the law now stands there is no implied covenant as to the sanitary condition in the letting of any house, except such house be let furnished or be let (unfurnished or furnished) to any one of the working-class. According to Allan,* the absence of any such implied covenant in the letting of an ordinary house was settled in *Hart v. Windsor* (12 M. & W. 68) and *Lane v. Cox* ([1897] 1 Q.B. 415), and the implication of such covenant in the letting of a furnished house by *Smith v. Marrable* (11 M. & W. 5) and other (later) cases. By Section 75 of the Housing of the Working Classes Act, 1890, it is enacted that

"In any contract made after the fourth day of August, one thousand eight hundred and eighty-five, for letting for habitation by persons of the working-classes a house or part of a house, there shall be implied a condition that the house is at the commencement of the holding in all respects reasonably fit for human occupation."

The section defines "letting for habitation by persons of the working-classes" to mean in England and Wales the letting of a house within the limit† for which rates can be compounded under

* Housing of the Working Classes Act, 1890. Allan and Allan, p. 106.

† £20 for the Metropolis, £18 for Liverpool, £10 for Manchester and Birmingham, and £9 for the rest of the country.

Section 3 of the Poor Rate Assessment and Collection Act, 1869, and in Scotland and Ireland a house rented at £4 per annum.

This section makes the lessor responsible for the proper condition of the house in a much wider sense than would be implied by a reference to its "sanitary condition." Such house is to be "in all respects reasonably fit" for occupation. The only reported case under this section mentioned by Allan is that of *Walker v. Hobbs* (23 Q.B.D. 458), which dealt with a matter of dilapidation rather than sanitation—the ceiling of one of the rooms falling down and injuring the plaintiff. The defendant contended, "(1) that the section only made the fitness of the premises a 'condition,' which, according to the strict common law meaning of condition, merely gives the tenant the power to repudiate the contract, but implies no promise on the part of the landlord; and (2) that the Act referred only to the sanitary state of the premises, and not to defective repair generally."* The Court decided against the defendant on both these points. According to this ruling a tenant can sue for breach of covenant, and the landlord is liable for the same. It has, however, to be noted that the "condition" has effect only at the commencement of the occupation, and that it has been decided that a weekly tenancy is a continuous tenancy, and that its commencement is the day of first taking. This was ruled in *Sarson v. Roberts* ([1895] 2 Q.B.D. 395), and there is no covenant that the house shall continue to remain "fit," but a tenant can recover if the defective condition be not discovered until some subsequent date (*Harrison v. Malet*, 3 T.L.R. 58).

Presumably it is the poverty of the lessees which prevents more frequent use of this section, but an interesting case (*Newman v. Sanger*) was recently before the Marylebone County Court, of which the following are the chief points:

On August 27th, 1898, the plaintiff rented the basement floor of No. 14, Portnall Road, Paddington, from the defendant, at a weekly rent of 6s.; on December 23rd next a case of diphtheria was reported in the plaintiff's family; on January 18th of this year the drains were examined by the sanitary authority and found defective, both by the water and chemical tests, and subsequently notices to amend the drainage, etc., were served on the defendant; and in June and July following four cases of scarlet fever were reported in the plaintiff's family. The defendant had not at that date amended the drains, etc. The plaintiff then left the house, and sued the defendant under Section 75 of the Housing of the Working-Classes Act, 1890. His Honour, after consideration, awarded the plaintiff the full amount claimed (£14 3s.) with damages (£4 17s.) less 12s. counterclaimed, and costs.

Notice of appeal was given.

* *Loc. cit.*, p. 106.

A CONTRIBUTION TO THE STUDY OF EPIDEMIC DIARRHŒA.*

By ARTHUR NEWSHOLME, M.D.

President of the Incorporated Society of Medical Officers of Health,
Medical Officer of Health of Brighton C.B.

THE honour which you have conferred upon me by electing me your President carries with it the onerous duty of delivering a Presidential Address. The Presidential Addresses of my predecessors appear to come under one of two categories, either dealing with the general politics of the Public Health Medical Service, or discussing some particular subject of which the author possesses special knowledge. I cannot hope to occupy your time profitably on the former head, and it remains for me therefore to attempt the discussion of some subject to which I have given special attention during the last year or two. In adopting the latter course, I must plead guilty, in choosing epidemic diarrhoea as my theme, to having chosen a subject which many will consider to be worn threadbare by reiterated consideration, and concerning which I will—to disarm criticism—at once state that I have no startling novelty to reveal. As a zealous and persistent student of the weekly and quarterly returns of the Registrar-General, I have been repeatedly struck with the relative immunity of certain towns from diarrhoea, and formed the intention some years ago of further investigating the matter as soon as time and comparative freedom from other work would enable me to do so. Towards the end of last year I was fortunate enough to secure the aid of Dr. W. Riach in making the numerous calculations on which the results to be hereafter given are based. Without this aid the substance of my address would have still remained in embryo.

It cannot be said that a disease which in 1897 caused 4·8 per cent. of the total deaths from all causes in England and Wales, as compared with 7·6 per cent. for the six other chief zymotic diseases, can be lightly disregarded, or cease to occupy a large share of our anxious attention. My friend Dr. Hayward has recently calculated that if diarrhoea as a cause of death during the first year of life were excluded from the death-returns, the difference in the English life-table would be as follows:

		Increase in Number of Survivors at Age 1 out of a Million at Birth.	Increase in Expectation of Life.
Males	...	+14,544	+0·75 year.
Females	...	+12,495	+0·67 "
Persons	...	+13,540	+0·71 "

* Presidential Address delivered before the Incorporated Society Medical Officers of Health, November, 1899.

The further results obtained by Dr. Hayward are so interesting that I insert them here for the purpose of comparison with diarrhoea:

Difference produced upon the Expectation of Life at Birth by excluding

	Phthisis	All Tubercular Diseases	Cancer	Enteric Fever	Scarlet Fever	Diphtheria	Measles	Whooping-cough	Diarrhoea
	At all Ages.							Under 5 years of age.	
Males ...	+2.56	+3.86	+0.39	+0.30	+0.53	+0.24	+0.68	+0.63	+0.95
Females ...	+2.57	+3.72	+0.83	+0.29	+0.57	+0.28	+0.67	+0.82	+0.87

I have hitherto spoken of diarrhoea as a disease, while obviously it is only the name of a symptom, which may be the most prominent feature in many diseases. It is necessary, therefore, in *limine*, to make good the claims of the official statistics of the General Register Office to a fair degree of credibility. The consciousness of the fact that diarrhoea is the name of a symptom, and not of a disease, has caused practitioners in recent years to certify many deaths caused by epidemic diarrhoea under the heading "Enteritis" or "Gastro-Enteritis." The amount of transference due to this fact is shown in Fig. 1.*

This figure shows that if we neglect the very high peaks caused by cholera, a large share of the improvement in the death-rate from diarrhoea is only apparent, being due to alteration in nomenclature. The vitiating effect upon the statistics of diarrhoea of the above cause has been illustrated by Dr. Louis Parkes by its influence on the age-incidence of deaths from diarrhoea and from enteritis.† Thus, in London the percentage of deaths under one year to total deaths from the same cause was in

	Diarrhoea and Cholera.	Enteritis.
1861-65 ...	62	80
1896-97 ...	79	68

The above disturbing influences give *prima-facie* ground for doubting the utility of the official statistics of diarrhoea. It would, however, I think, be folly to refrain from studying these statistics. I hope to be able to show that, when utilized with due regard to their defects, they may form a satisfactory basis for valid conclusions. In the first place, the same transferences from diarrhoea to other headings are occurring in the death-returns of every large town or district; and there are, so far as I can see, no just grounds for thinking that their action is on the whole greater in one than in another. The statistics to be hereafter given nearly all deal with populations exceeding 100,000, among which the vagaries of

* From the third edition of "Elements of Vital Statistics," page 205.

† *British Medical Journal*, May 28, 1898.

death certification by individual practitioners have only a modicum of effect. The blessed law of averages appears to me to render the diarrhoeal death-rate of one town fairly comparable with that of any other town in the same year, though obviously, in comparing diarrhoeal death-rates in the present decennium with those of

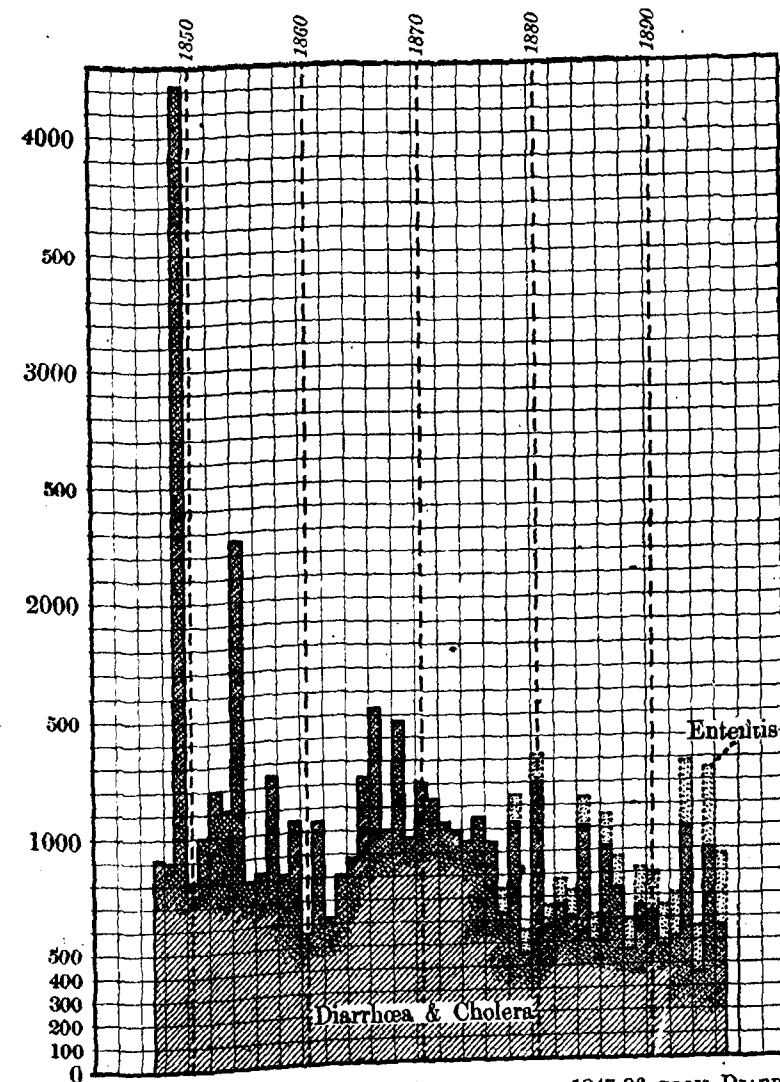


FIG. 1.—ANNUAL DEATH-RATE PER MILLION LIVING 1847-96 FROM DIARRHOEA PLUS CHOLERA, AND FROM ENTERITIS IN ENGLAND AND WALES.

earlier years, we must allow for an unknown percentage of transference from diarrhoea to other headings. The argument on this point is of primary importance, as, unless its validity be accepted, the conclusions deduced in the following remarks from a com-

parison of the diarrhoeal mortality in different towns must be regarded as possibly fallacious. I do not regard them as fallacious. I am confident that the facts for corresponding years are truly comparable.

I may remind you at this stage of the valuable paper by Dr. Ashby, and of the report of the committee appointed by the Home Counties Branch of our Society on the classification of "diarrhoea" deaths.* This committee has reported that the classification of deaths from diarrhoea "is at the present time in such a state of utter and hopeless confusion as to render the statistics of diarrhoea deaths, and consequently of zymotic death-rates, in different localities misleading, and altogether useless for comparison. Moreover it must be noted that there is not uniformity in the classification adopted by the Registrars-General in the United Kingdom. The confusion is mainly due to the unnecessarily numerous names employed by medical men to designate one and the same disease in their death-certificates."

The above remarks amply justify the important steps which have been taken to secure the consideration of this subject by a committee of the Royal College of Physicians. There is great need for uniformity of certification and classification. Fallacies due to alterations of fashion in death-certification appear to be unavoidable; fallacies of classification only require careful instruction and co-operation for their avoidance.

It may, however, be pointed out that in the General Register Office, Somerset House, the following instructions (which I have Dr. Tatham's permission to publish) have been uniformly adopted for a long series of years in classifying diarrhoeal deaths:

EXTRACT FROM INSTRUCTIONS TO REGISTRARS FOR MAKING WEEKLY RETURNS OF BIRTHS AND DEATHS.

"DIARRHOEA.—Deaths from *Intestinal* or *Enteric Catarrh* and from *Gastro-Intestinal* or *Gastro-Enteric Catarrh* should be included under this heading. Diarrhoea should, however, be counted as the cause of death, *only when stated alone, or when coupled with some ill-defined cause of death, such as atrophy, debility, marasmus, convulsions, teething, old age, or senile decay.*"

The weekly and quarterly returns of the Registrar-General have thus been consistently compiled for a long series of years on a uniform system, and although this does not entirely eliminate errors caused by the occasional carelessness or lack of intelligence of local registrars, who send up these returns to the General Register Office,

* PUBLIC HEALTH, May, 1899, page 589 *et seq.*

there can, I think, be little doubt that diarrhoeal death-rates for the great towns, calculated from the Registrar-General's data, are fairly comparable in each year with one another. In this respect they differ widely, as shown by the report of the committee of our Home Counties Branch, from diarrhoeal death-rates compiled by local medical officers of health, without any exact rules to guide them. This point is of great importance as bearing on the accuracy of the death-rates to be shortly submitted to you.

It is obvious that the above-quoted rule for local registrars is not free from objection. It would be difficult, for instance, to justify the exclusion of "enteritis" from and the inclusion of "enteric catarrh" along with diarrhoea. But it is a rule consistently maintained, and I recommend it for the adoption of all medical officers of health until a new one is adopted. It is quite easy for the medical officer of health to have a second column in his statistical report for all deaths under other names which, in his opinion, should be included with epidemic diarrhoea; and the gradual swelling of the figures under the latter head will furnish a useful and steady check on erroneous conclusions that might otherwise be deduced from the official figures on the Registrar-General's basis.

It is extremely difficult to see in what directions reform in the classification of diarrhoeal deaths is practicable. I think it is highly desirable that we should remember the probable identity between most of the sporadic cases of diarrhoea occurring in the non-diarrhoeal season and cases of epidemic diarrhoea, and not attempt to insist in every instance on the prefix "epidemic." On the other hand, it is highly desirable that deaths now certified as "gastro-enteritis" or "enteritis" should have the prefix "epidemic" when, in the opinion of the certifying practitioner, they are really deaths from the specific disease, epidemic diarrhoea.

It will be noted that I have throughout assumed the existence of a specific disease, epidemic diarrhoea—would that some acceptable name could be devised which would clearly and differentially designate it!—although in the official statistics registered deaths from this disease have an admixture of an unknown number of deaths from other diseases, and *per contra* an increasing number of deaths from epidemic diarrhoea now appear under other headings. Nor do I propose to waste time by discussing this proposition, as it will, I think, be accepted by all.

Method of Statement of Death-rate from Diarrhoea.—Having stated the limits within which the Registrar-General's figures may, if caution be exercised, be used with approximate accuracy, we come next to the method of statement of diarrhoeal death-rates. About

75 per cent. of the total registered deaths from diarrhoea occur under one year of age. In the third quarter of each year the proportion is still higher. The Registrar-General's official method is to state the deaths from diarrhoea in terms of the total population. By this method towns with a large infantile population, *i.e.*, with a high birth-rate, are unfairly handicapped in the comparison. This is clear from the following examples taken from "Elements of Vital Statistics" (third edition, page 188):

Table A.

Place.	Deaths from Diarrhoea in 1896	
	Per 1,000 of Population.	Per 1,000 Births.
Dover	42	15.7
Hastings	26	14.1
Percentage excess of Dover over Hastings	+61.5 per cent.	+11.4 per cent.
Huddersfield	26	12.9
Newcastle-on-Tyne	51	16.4
Percentage excess of Newcastle over Huddersfield	+96.1 per cent.	+27.1 per cent.

The most accurate method of all would be to state the deaths from diarrhoea under one year of age per 1,000 births; but statistics for the thirty-three great English towns on this basis are not given in the quarterly reports of the Registrar-General. Failing this, it is clear that the statement of total deaths from diarrhoea in terms of births, which is employed exclusively in the present inquiry, is much more accurate than a statement of these deaths in terms of the total population.

Through the kindness of Dr. Niven, I have been supplied with the necessary data for the calculation of the following diarrhoeal death-rates for each township of Manchester. The letters in brackets indicate the relative position of each township as regards diarrhoea, when its death-rate from this disease is stated according to each of the three methods already indicated. The table is inserted here as an example of the relative accuracy of the three methods mentioned above. Incidentally it throws a flood of light on the influence of social and sanitary circumstances on the diarrhoeal death-rate.

Of the two available methods, the statement of the diarrhoeal mortality in proportion to the infantile population, being the more

Table B.—Mean Death-rate from Diarrhoea in the Townships of Manchester in the Three Years 1896-98.

Manchester Townships.	Deaths under One Year per 1,000 Births.	Deaths at all Ages per 1,000 Births.	Deaths at all Ages per 1,000 of Population.	Nature of Subsoil.
I. Ancoats	44.5 (c & d)	64.5 (b)	2.54 (a)	The portion bounded by Deansgate and the river Irwell is sand for a depth of several feet, then sandstone rock, the rest of the area being clay for a depth of 15 to 20 feet deep, then sandstone rock. { South portion, clay; north portion, sand; east portion, wet sand. { East portion, wet sand; west portion, sand. { North portion, sand; south portion, wet clay; west portion, wet sand. { North portion, clay; south portion, clay and some sand, also tips. { East portion, clay; south portion, wet sand, sand and clay. Clay. Chiefly clay. Chiefly clay. Clay to about 8 or 9 feet deep, then wet sand. Chiefly clay to a depth of about 10 or 15 feet, then sandstone rock. Chiefly clay to about 9 or 10 feet deep, then sand. Hard clay to the depth of any of our sewers, say up to 25 feet. Chiefly clay, but in some portions of Rusholme sandstone under the clay at a depth of about 10 or 12 feet. Gravel and sand to a depth of about 8 or 10 feet in portions of this district, then sandstone rock; other portions clay to a depth of about 10 feet, then sandstone rock. Chiefly gravel to a depth of about 10 or 12 feet, then shallow bed of clay, afterwards sandstone rock.
Central	53.5 (b)	69.3 (a)	2.08 (d)	
St. George's	36.1 (i)	53.8 (g)	1.89 (e & f)	
Cheetham	20.9 (p)	24.0 (p)	.88 (p)	
Crumpsall	19.2 (q)	21.0 (q)	.42 (q)	
Blackley	6.2 (r)	10.9 (r)	.29 (r)	
Harpurhey	38.2 (g & h)	46.8 (i)	1.83 (g)	
Moston	25.6 (o)	32.7 (o)	1.17 (l & m)	
Newton	28.7 (l)	38.2 (l)	1.17 (l & m)	
Bradford	44.5 (c & d)	62.5 (c)	2.38 (c)	
Beswick	32.8 (j)	43.3 (j)	1.58 (j)	
Clayton	53.9 (a)	59.9 (d)	2.44 (b)	
Ardwick	32.1 (k)	41.8 (k)	1.54 (k)	
Openshaw	41.4 (f)	54.1 (e & f)	1.86 (i)	
West Gorton	42.7 (e)	54.1 (e & f)	1.89 (e & f)	
Rusholme and Kirk	27.2 (m)	35.1 (m)	.91 (n)	
Chorlton-upon-Medlock	27.0 (n)	34.3 (n)	.87 (o)	
Hulme	38.2 (g & h)	51.6 (h)	1.74 (h)	

NOTE.—The letters in brackets indicate the order of the diarrhoeal death-rate of each township (beginning with the heaviest death-rate) as displayed by the particular method of stating the diarrhoeal death-rate adopted in each column. The variations of position produced by variations of method can thus be seen at a glance.

accurate, is adopted throughout the present investigation. The results thus obtained will be stated almost entirely diagrammatically to avoid the printing of elaborate statistical tables, and to enable the eye to institute comparisons with the minimum of fatigue. It

Table C.—Great Towns in Order of their Average Annual Death-rate from Diarrhoea in the Seventeen Years 1882-98 inclusive, per 1,000 Births.

	Entire Year.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Percentage of Total Deaths from Diarrhoea occurring in 3rd Quarter of Year.
Halifax ...	12.4	4.2	5.4	30.3	9.9	61
Huddersfield ...	15.7	5.0	5.1	42.6	10.3	68
Bristol ...	18.8	6.5	9.1	44.1	15.5	59
Oldham ...	19.8	7.4	8.3	46.1	17.4	58
Edinburgh ...	20.9	10.7	12.2	42.2	18.7	50
Plymouth ...	22.3	3.9	8.9	64.7	11.8	72
Newcastle-upon-Tyne ...	22.4	4.9	6.3	62.8	15.6	70
Derby ...	22.6	5.4	6.0	67.2	12.1	74
Birkenhead ...	23.2	5.7	8.3	68.6	10.2	74
London ...	23.3	4.7	8.3	70.8	9.5	76
Glasgow ...	23.9	12.1	14.1	51.7	17.7	54
Cardiff ...	24.6	6.0	8.8	68.1	15.4	69
Brighton ...	27.6	3.6	6.5	87.0	13.2	79
Dublin ...	28.1	10.4	9.3	67.3	25.6	60
Portsmouth ...	31.4	3.9	7.9	102.0	11.7	82
Sunderland ...	31.7	4.5	6.8	97.0	18.6	76
Norwich ...	32.4	3.5	7.1	103.0	16.1	79
Manchester ...	32.7	9.1	13.4	88.0	20.2	67
Nottingham ...	33.9	7.1	9.3	102.0	17.1	76
Bradford ...	34.2	6.8	11.7	98.9	19.3	72
Leeds ...	34.3	4.5	8.9	107.0	16.7	78
Liverpool ...	34.8	6.8	12.5	102.0	17.9	73
Sheffield ...	35.6	4.8	7.6	116.0	14.0	82
Wolverhampton ...	37.4	7.1	8.5	112.0	21.9	75
Hull ...	37.9	5.3	8.2	118.0	20.1	78
Birmingham ...	38.0	7.9	11.2	113.0	19.9	74
Salford ...	40.7	9.7	14.3	114.0	24.6	70
Blackburn ...	41.8	16.5	15.0	89.3	35.0	54
Bolton ...	42.0	10.5	14.2	112.0	31.5	67
Leicester ...	48.4	3.6	13.3	163.6	13.1	84
Preston ...	60.4	13.2	19.6	173.0	35.9	72

may be claimed, furthermore, that the diagrammatic method enables points of resemblance and contrast to be discovered, which would escape notice had we to deal with a mass of statistical tables. The statistics of thirty-one towns have been investigated, viz., twenty-eight English towns, along with Dublin, Edinburgh, and Glasgow.

For these towns the necessary statistical data are available in the English Registrar-General's quarterly reports, in some instances from 1876, in others from 1882.

Table C summarizes the experience of these towns in the seventeen years, 1882-98 inclusive, the towns being placed in the order of their average annual death-rate from diarrhoea.

In the following table the same towns are placed in the order of their quarterly death-rates from diarrhoea:

Table D.—List of Great Towns in Order of Amount of Diarrhoea in each Quarter of the Year (Mean of 1882-98), beginning with the Town of Lowest Mortality.

1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
1. Norwich.	Huddersfield.	Halifax.	London.
2. { Brighton.	Halifax.	Edinburgh.	Halifax.
3. { Leicester.	Derby.	Huddersfield.	Birkenhead.
4. { Portsmouth.	Newcastle-on-Tyne.	Bristol.	Huddersfield.
5. { Plymouth.	Brighton.	Oldham.	Portsmouth.
6. Halifax.	Sunderland.	Glasgow.	Plymouth.
7. { Leeds.	Norwich.	Newcastle-on-Tyne.	Derby.
8. { Sunderland.	Sheffield.	Plymouth.	Leicester.
9. London.	Portsmouth.	Derby.	Brighton.
10. Sheffield.	Hull.	Dublin.	Sheffield.
11. Newcastle-on-Tyne.	London.	Cardiff.	Cardiff.
12. Huddersfield.	Birkenhead.	Birkenhead.	Bristol.
13. Hull.	Oldham.	London.	Newcastle-on-Tyne.
14. Derby.	Wolverhampton.	Brighton.	Norwich.
15. Birkenhead.	Cardiff.	Manchester.	Leeds.
16. Cardiff.	{ Plymouth.	Blackburn.	Nottingham.
17. Bristol.	{ Leeds.	Sunderland.	Oldham.
18. { Bradford.	{ Bristol.	Bradford.	Glasgow.
19. { Liverpool.	{ Dublin.	{ Portsmouth.	Liverpool.
20. { Nottingham.	{ Nottingham.	{ Nottingham.	Sunderland.
21. { Wolverhampton.	{ Birmingham.	{ Liverpool.	Edinburgh.
22. Oldham.	Bradford.	Norwich.	Bradford.
23. Birmingham.	Edinburgh.	Leeds.	Birmingham.
24. Manchester.	Liverpool.	{ Wolverhampton.	Hull.
25. Salford.	Leicester.	{ Bolton.	Manchester.
26. Dublin.	Manchester.	{ Birmingham.	Wolverhampton.
27. Bolton.	Glasgow.	Salford.	Salford.
28. Edinburgh.	Bolton.	Sheffield.	Dublin.
29. Glasgow.	Salford.	Hull.	Bolton.
30. Preston.	Blackburn.	Leicester.	Blackburn.
31. Blackburn.	Preston.	Preston.	Preston.

(Towns bracketed together have an equal death-rate.)

Seasonal Incidence of Diarrhoea.—I have elsewhere dwelt on the disadvantages associated with the statement of average death-rates from a zymotic disease for a series of years, as the towns or districts under comparison may evidently have been affected to a variable extent by the causes of the disease. The above table must be regarded only as a rough preliminary test of the relative status of the towns enumerated in it. It possesses, however, a much higher value as a criterion of the relative seasonal incidence of fatal diarrhoea. We may, therefore, discuss in the first instance this important part of our subject. It will be noted that in all the towns the highest diarrhoeal mortality is in the third or summer quarter of the year. The proportion of diarrhoeal mortality, however, occurring in this quarter varies greatly, being at the one extreme 50 per cent. of the total annual diarrhoeal mortality in Edinburgh, and 54 per cent. in Blackburn and in Glasgow, and at the other extreme 82 per cent. in Portsmouth and Sheffield, and 84 per cent. in Leicester. Obviously a high proportional mortality in the summer quarter might imply either a low mortality in the three other quarters, or an excessive mortality in the summer quarter, or both. It is necessary, therefore, to correct impressions given by the last column in the preceding table by a study of the four preceding columns in the same table.

In some of the towns, *e.g.*, Blackburn, Preston, Glasgow, Edinburgh, and Dublin, diarrhoea has the character of an endemic disease persistently present through every season of the year; while in towns like Leicester, Norwich, Portsmouth, and Brighton, it partakes much more of the character of an epidemic disease, reappearing in greater or less degree at its proper season, while the amount at other seasons is comparatively insignificant. There is a further distinction. Some of the towns of endemic diarrhoea have a large amount of summer or epidemic diarrhoea (as Bolton and Preston), while in others of them (as Dublin, Edinburgh, and Glasgow) there is comparatively little epidemic diarrhoea. Blackburn is a case requiring further elucidation as to the cause of its uniquely high diarrhoeal death-rate in the first quarter, although in the third quarter there are fifteen other towns with a greater amount of fatal diarrhoea. Did time permit, it would be desirable to pursue the study of the seasonal incidence of diarrhoea in much greater detail. For those wishing to do this, the necessary details are contained in the diagrams relating to the thirty-one towns on pages 169 to 210.

Before leaving this branch of the subject, we may raise the question whether any vagaries of medical certification of causes

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of death can account for the remarkable differences of seasonal incidence of diarrhoea briefly indicated in the preceding remarks. Is it possible, for instance, that in Blackburn the practitioners are, on the whole, less highly educated than in the other towns, and that thus many ill-defined causes of death are returned as diarrhoea, when the specific disease, which alone is properly indicated by that name, is absent? I do not think for one moment that any such hypothesis can be substantiated. Still less is it likely to be the case in University cities like Edinburgh and Glasgow, in which also the amount of diarrhoea in the first quarter of the year is very excessive. Nor can the excessive endemicity of diarrhoea in the above cities be explained on the supposition that practitioners of the Scotch and Irish schools certify deaths as from diarrhoea which, by practitioners trained in other schools, would be entered under more definite headings. It must be remembered that we are dealing with towns nearly all of which have a population exceeding 100,000, which implies also that the vagaries of individual medical death-certificates have but little effect in disturbing the total effect. I think, therefore, it may be concluded that the remarkable differences of seasonal incidence of diarrhoea shown in the table on page 146 indicate in the main real facts requiring an explanation, which the facts so far available do not enable us to give.

Our next step is to study the detailed seasonal and annual incidence of fatal diarrhoea in each of the thirty-one towns. This is done in the following diagrams, the towns being arranged in order of their relative freedom from diarrhoea. All the diagrams having been drawn to the same scale (indicated on the left margin as deaths per 1,000 births), are exactly comparable. The lowest part of each vertical column represents the share of each year's diarrhoeal mortality occurring in the first, the next portion that in the second, the next that in the third, and the highest portion that in the fourth quarter of each year. It is possible thus to see at a glance the relative share of diarrhoeal mortality in each part of a year, and the variations in the incidence of diarrhoea year by year.

For convenience, the diagrams and particulars relating to the towns whose experience respecting diarrhoea is thus graphically stated are placed at the end (pages 169 to 210), in order that the argumentative part of my address may be continuous. Before reading the next pages, however, the reader should examine the diagrams.

Causation of Epidemic Diarrhoea.—Having the elaborate comparative data already given, and the further data on pages 169 to 210 before us, we are in a position to discuss the ætiology of epidemic diarrhoea. Dr. Ballard's report on the subject (issued 1888) was an

interim report, the broad results were stated by him to be provisional only, and it is a striking testimony to his acumen that practically nothing he said needs now to be unsaid. It has always appeared to me, however, a great loss to science that the detailed evidence as to the differential incidence of fatal diarrhoea in different towns, and as to the differences of local conditions associated with these variations, was not published along with Dr. Ballard's provisional statement of results. This was evidently intended to be done in a later report, the publication of which Dr. Ballard's death unhappily rendered impossible. My present contribution may serve in some measure to fill the hiatus thus left.

I should here draw attention to a most valuable paper on "The Causation of Summer Diarrhoea,"* read by Dr. Longstaff before our Society in February, 1880, in which, after giving elaborate statistics, he arrives at the conclusion that "summer diarrhoea is caused by the pollution of air, water, and food with some product or products of the decomposition of organic matter during very hot weather." We cannot, in 1899, be said to have advanced much beyond this point.

A reference to past volumes of our official journal, *PUBLIC HEALTH*, will discover many other valuable contributions to the elucidation of the problems of epidemic diarrhoea—for instance, on its relation to infant feeding (Dr. Hope) and to public scavenging (Dr. Spottiswoode Cameron).

The results set forth in Table C and in the diagrams on pages 169 to 210 indicate that, although some of the apparent relative freedom from diarrhoea of such towns as Halifax and Huddersfield is caused by the paucity of the infantile population who form its chief victims, there remain great differences for which this statistical explanation will not suffice. In investigating the causes of these differences, and of similar (perhaps even more marked differences) in towns to which I have not been able to extend the inquiry, lies our chief hope of arriving at a true conception of the causation of diarrhoea.

"The causes of infant diarrhoeal mortality are multifarious" (Ballard), and that there may be and is a composition of causes is obvious from a perusal of his report, and from the paragraphs on this subject which appear in all annual reports of medical officers of health, and in which congenital debility, maternal industrial occupations, artificial feeding, overcrowding, effluvia from defective drains or from privies or closets, defective scavenging, as well as high temperature of air and soil and deficient rainfall, appear *inter alia* as important factors in the causation of this disease. If, however, we accept the rigid logical definition of cause as the "uncondi-

* Published in the Society's Transactions for 1880-81.

tional invariable antecedent" of a phenomenon, and think of the relation between the two as one of absolute dependence—the effect, not merely succeeding to, but proceeding from, the cause—we must narrow our view. But even then we can admit, and in fact necessity requires in this instance, the conception of a composition of causes. Every effect has an ancestry of causes, and every cause a posterity of effects. A spreading ancestry and a spreading posterity are of the essence of causation, from which it follows that primary and subsidiary causes and effects inevitably overlap, and their separation as a means of ascertaining the essential causation of a phenomenon is an extremely difficult problem. It may happen, furthermore, that in separating the factors of causation we shall obtain but an incomplete conception of the origin of a phenomenon, for things, as we know them, are not complete in themselves and self-contained.

The one factor which approaches most nearly to being the "unconditional invariable antecedent" of epidemic diarrhoea is the hypothetical micro-organism, in the absence of which this disease, being a specific febrile disease, almost certainly does not occur. This may be the *Bacillus enteritidis sporogenes* of Klein, but let us hope not, as this particular organism possesses a very persistent vitality. But even this "invariable antecedent" can scarcely claim to be the "unconditional" cause of epidemic diarrhoea. It continues to cause sporadic cases of diarrhoea in our great towns throughout every month of the year, and throughout years in which epidemic diarrhoea is almost absent; but for the occurrence of epidemic diarrhoea certain conditions of temperature and rainfall and soil, and possibly other factors, are required. Some of these factors may now be considered in turn.

A.—In the first place, *epidemic diarrhoea is chiefly a disease of urban life*. Thus, in the rural part of West Sussex the death-rate from diarrhoea in the two years 1897-98 was 10.1 per 1,000 births, as compared with 19.1 in the urban portion of the same administrative county. A study of Table 27 in the Registrar-General's annual report brings out the same contrast between counties chiefly rural and those chiefly urban, even after ample allowance is made for the lower birth-rates in the former. There is a wide-spread impression that diarrhoea is chiefly a modern disease, which has been the product of the modern urbanization of our population. This is true, because a larger proportion of our population is urban than in the last century. There is, however, less diarrhoea in the urban populations of the present than of the last century. Dr. Creighton claims, and I think rightly,* to have "proved from the London bills of

* "History of Epidemics," vol. ii., pages vii, 763.

mortality of the seventeenth and eighteenth centuries that infantile diarrhoea, which is now one of the most important causes of death in some of the great manufacturing and shipping towns, was formerly still more deadly to the infancy of the capital in a hot summer or autumn." Sydenham in 1669 speaks of the regular appearance of cholera morbus at the end of each summer and beginning of autumn, comparing its regularity to that of the coming of the swallow in spring or of the cuckoo in early summer. "The two worst weeks of an unhealthy summer or autumn raised the London deaths in former times" (eighteenth century) "relatively as much as the whole diarrhoeal season would do now."

The great increase of diarrhoea in the present century is associated with a more than proportional increase of urban population; and it is a satisfactory point that, notwithstanding the steadily increasing urbanization of our population, the death-rate from diarrhoea has decreased from 1,000 per million of population in 1871-75 and 832 in 1876-80, to 667 in 1886-90 and 630 in 1891-95. (Allowance has to be made for lowering of birth-rate and for transference of deaths to other headings.) It is not surprising that in London in the last two centuries diarrhoea should have been so much more fatal than now. As Dr. Creighton puts it, London was "far more urban than now," its streets were narrower, and there were more courts and alleys. Window-taxes were in force, houses were full of effluvia from the "vaults" in the basement, and the whole soil of the city was full of organic impurities, derived from both the living and the dead. It is not difficult to work out points of resemblance between the state of matters in old London and in some of our modern manufacturing towns.

It cannot be said that mere density of population (as measured by the number of persons per acre) bears any proportion to diarrhoeal mortality. The municipal borough of Brighton has a greater density than any of the other great English towns with two exceptions, and yet there are seventeen other English towns with a higher diarrhoeal death-rate. Other instances of discrepancy between degree of density of population and height of diarrhoeal death-rate might be given if necessary.

At the census of 1891 information was obtained as to the proportion of total tenements with four rooms and under, and the amount of overcrowding, overcrowding being assumed to exist when the number of persons living in a tenement averaged more than two for each room. We may compare in this respect the towns at the two ends of the scale of diarrhoeal mortality. (See Table E.)

* Creighton, *op. cit.*, page 763.

Table E.

Town.	Diarrhoeal Death-rate Average of 1887-95	of 100 Tenements or dwellings of all kinds, the Number consisting of Four Rooms, or less than this Number, was	of every 100 of the Total Population, the Number overcrowded, i.e., living more than Two in a Room, was
Halifax	12.4	69	21.3
Huddersfield	15.7	71	19.9
Bristol	18.8	49	8.0
Oldham	19.8	76	10.1
Blackburn	41.3	64	7.0
Bolton	42.0	69	11.2
Leicester	48.4	25	2.2
Preston	60.4	46	4.1

The figures of the last census as to the variations of overcrowding are very extraordinary. If, as is likely, they possess a certain measure of value, the experience of both Halifax and Leicester might be held to indicate that there is an inverse relationship between overcrowding and diarrhoea, which is a *reductio ad absurdum*. All that we can say with safety is that we have not discovered in the preceding statistics any explanation of the great differences in diarrhoeal mortality in English towns; and we must leave unanswered, for the present, the question, Why is epidemic diarrhoea chiefly a disease of urban life? We turn next to social and industrial conditions.

B. *Epidemic diarrhoea as a fatal disease is a disease of the artisan and still more of the lower labouring classes to a preponderant extent.* Although it is difficult to adduce satisfactory class-statistics on this point, the truth of the foregoing statement will be generally admitted. The diarrhoeal death-rates for the different townships of Manchester (page 145), to those who are familiar with the class-distribution of the population of that city, teach the same lesson. So do the figures for the different districts of London. The lower the social status, the greater is the rate of mortality from diarrhoea. But why? Is it that the mother's attention is distracted from her infant by the necessity of sharing in the earning of the family income, or that the home-conditions are less favourable?

On the industrial occupation and social status of married women, the figures of the last census shed some light. The figures in the first two columns of Table F are taken from a paper by Miss Collett, M.A.*

At first sight Table F appears to support the view that where a large proportion of married women are engaged in non-domestic

* *Journ. Royal Statistical Society*, June, 1898. An abstract of this paper will be found in *PUBLIC HEALTH*, vol. x., p. 374, August, 1898.

occupations a high infantile mortality from diarrhoea is favoured. Preston, Leicester and Blackburn all show this coincidence, Bolton and Salford to a less extent. The sharp contrast in regard to diarrhoeal mortality between Oldham and Leicester and between Wolverhampton and Derby, and numerous other inconsistencies in the table, drive one, however, to the conclusion that industrial occupation of women is a contributory, and not a chief, factor in the causation of epidemic diarrhoea. The case of Oldham is particularly instructive in this respect.

Doubtless neglect of infants, implying dirtiness of food, etc., tends to provoke diarrhoea, and only a more intimate acquaintance with the circumstances of local life would enable us to state why a certain amount of industrial occupation of married women should be associated in Oldham with a certain amount, and in Leicester with double

Table F.

Towns in which the Percentage of Wives and Widows between 25 and 45 Years of Age returned as Occupied was in 1891		Percentage of Females above 10 returned as Indoor Domestic Servants, 1901	Mean Death-rate from Diarrhoea per 1,000 Infants, 1902 (See Table C, p. 146.)
At least			
47	Blackburn	5	30
39	Preston	6	60
25	Oldham and Leicester	6	20 and 41
20	Nottingham and Bradford	7	33 and 34
15	Birmingham, Bolton, Salford and Manchester	7	38, 41, 40, 33
10	Norwich, Bristol, Huddersfield, Halifax and Leeds	9	31, 19, 16, 12, 34
5	Brighton, Liverpool and Sheffield	11	24, 35, 36
1	Portsmouth, Plymouth, Wolverhampton, Derby, Hull and Cardiff	11	30, 22, 30, 22, 37, 24

this amount of fatal diarrhoea. It is not likely that in one case it is chiefly the married women without, and in the other chiefly the married women with, families who are industrially employed. Furthermore, the two towns have the same social status as judged by the proportion of domestic servants.

Taking the proportion of females above ten who are returned as indoor servants as a rough test of social status, it is clear that, as a rule, the higher the status, the less the amount of diarrhoea. To what causes may the relative immunity from diarrhoea of infants of a higher social status be ascribed? They are, doubtless, complex, including greater care of infants, more cleanly storage and preparation of food, and especially its storage where it is less likely to receive the specific infection to which epidemic diarrhoea is due.

But social status is not the only factor. Otherwise, why should Oldham, with only 6 per cent. of domestic servants, and Huddersfield and Halifax, with only 9 per cent., have a lower diarrhoeal death-rate than Portsmouth, Liverpool, Sheffield, etc., which have 11 per cent. of domestic servants? It is quite conceivable, of course, that the influence of industrial occupation of mothers and of what is connoted by low social status, may, in some of the above instances, be counterbalanced by other factors which are inhibitory to the causation of diarrhoea. Further light will be thrown on this possibility as we proceed.

C.—Towns which have adopted the water-carriage system of sewerage have, as a rule, much less diarrhoea than those retaining other methods of removal of excrement. The information obtainable on this point has been stated in full for each town (pages 169 to 210). In the last column of Table G a rough summary is attempted.

Speaking generally, w.c. towns have much less diarrhoea than towns with privy middens. Leicester and Liverpool form exceptions to this rule; but in both of them there was, before the w.c. period, protracted pollution of the soil, and it is possible that trough closets and other latrines, common to more than one house in Liverpool, tend to keep up the diarrhoeal mortality, as well as social factors already mentioned. Of these two, Leicester shows some improvement, Liverpool none, since the adoption of water-closets. Derby, with a considerable proportion of middens, has a very good record for diarrhoea. Several towns having chiefly pail-closets, as Halifax, Huddersfield, and Oldham, occupy a remarkably favourable position. It cannot, I think, be seriously argued, that however carefully the scavenging is done, a pail-closet can, in a town, be as free from nuisance as a w.c.; and I am strongly of opinion that the favourable position of these three towns is notwithstanding the pail-closets, and that they might still further improve their status by a change to the w.c. system. What are the countervailing influences keeping the diarrhoeal mortality of these three towns low, notwithstanding the—in my opinion—necessarily unfavourable effect of pail-closets, we shall shortly see.

D.—Towns with the most perfect scavenging arrangements have the least epidemic diarrhoea. Here again I must confess my inability to produce exact statistical proof of the thesis thus laid down. It is based, however, on careful inquiry and observation, and it will, I think, be found correct. I include under scavenging the methods of removal of house refuse (i.e. dust-bin refuse, and the contents of privies and pails where these exist), and cleansing and washing streets, courts, and yards. Of the two, the removal of house refuse is the more important in this connection, and it is not

possible that local authorities will much longer content themselves with a removal of house refuse at weekly intervals. We most of us distribute official circulars each summer, advising householders

Table G.*

Towns in Order of Diarrhoeal Death rate.	Character of Soil	Gradient of Town.	Method of Disposal of Excrement
1. Halifax	mostly impervious, $\frac{1}{2}$ pervious	steep	about $\frac{1}{2}$ pails, $\frac{1}{2}$ w.c.
2. Huddersfield	mostly impervious	steep	chiefly pails
3. Bristol	mostly impervious	steep	w.c.
4. Oldham	mostly impervious	steep	chiefly pails
5. Edinburgh	mostly impervious	steep	w.c.
6. Plymouth	partially impervious	rather flat	w.c.
7. Newcastle-upon-Tyne	impervious	good	chiefly w.c., about $\frac{1}{2}$ pails, and $\frac{1}{2}$ middens, $\frac{1}{2}$ w.c.
8. Derby	mostly impervious	good	chiefly w.c., about $\frac{1}{2}$ pails, and $\frac{1}{2}$ middens, $\frac{1}{2}$ w.c.
9. Birkenhead	mostly impervious	fair	chiefly w.c.
10. London	variable	fair	w.c.
11. Glasgow	pervious	good	chiefly w.c.
12. Cardiff	$\frac{1}{2}$ pervious, $\frac{1}{2}$ impervious	good	w.c.
13. Brighton	pervious	steep	w.c.
14. Dublin	$\frac{1}{2}$ impervious, $\frac{1}{2}$ pervious	flat	w.c.
15. Portsmouth	chiefly pervious	flat	w.c.
16. Sunderland	chiefly impervious	flat	chiefly middens
17. Norwich	pervious	good	about $\frac{1}{2}$ middens, $\frac{1}{2}$ pails, $\frac{1}{2}$ w.c.
18. Manchester	partially pervious	fair	about $\frac{1}{2}$ middens, $\frac{1}{2}$ pails, $\frac{1}{2}$ w.c.
19. Nottingham	pervious	fair	$\frac{1}{2}$ pails, $\frac{1}{2}$ w.c.
20. Bradford	impervious	rather steep	$\frac{1}{2}$ middens, $\frac{1}{2}$ w.c.
21. Leeds	chiefly impervious	good	about $\frac{1}{2}$ w.c., $\frac{1}{2}$ trough closets, $\frac{1}{2}$ middens, etc.
22. Liverpool	pervious	fair	w.c.
23. Sheffield	chiefly impervious	very good	$\frac{1}{2}$ middens, $\frac{1}{2}$ w.c.
24. Wolverhampton	partially impervious	very flat	$\frac{1}{2}$ pails, $\frac{1}{2}$ w.c.
25. Hull	partially impervious	flat	chiefly middens
26. Birmingham	pervious	fair	about $\frac{1}{2}$ middens, $\frac{1}{2}$ pails, and $\frac{1}{2}$ w.c.
27. Salford	impervious	flat	$\frac{1}{2}$ middens
28. Blackburn	$\frac{1}{2}$ pervious, $\frac{1}{2}$ impervious	steep	$\frac{1}{2}$ middens, $\frac{1}{2}$ pails, and $\frac{1}{2}$ w.c.
29. Bolton	partially impervious	fair	$\frac{1}{2}$ middens, $\frac{1}{2}$ pails, $\frac{1}{2}$ waste water and w.c.
30. Leicester	partially impervious	rather flat	chiefly w.c., decreasing number of pails and middens
31. Preston	partially impervious	flat	chiefly middens, $\frac{1}{2}$ w.c.

* The information summarised in the above table, and given in detail on pages 169 to 210, is derived partly from the annual reports of medical officers of health, partly from direct answers to inquiries (for which I am greatly indebted to my confrères who have thus assisted me), and partly from a valuable report by Dr. Scurfield, dated January, 1897.

to burn all decomposable house refuse. We must, however, recognise the fact that, with the steadily increasing use of gas and paraffin as fuel (particularly in the summer months), this advice is becoming less practicable, and that the responsibilities of local authorities to secure early removal and efficient disposal of such refuse are becoming more weighty. Efficient scavenging of streets and courts is but little less important than house scavenging, and how grievously it is neglected in most towns!

It is impossible for me to enter into a discussion of the relative merits of granite-sets, wood, asphalt, or macadam as road materials. The answer must vary according to local circumstances. The essential point is not to allow organic debris to accumulate, or dust to be scattered about. It is a mere commonplace to state that diarrhoea, like all other infectious diseases, is chiefly caused by organic dust, but this obvious truth needs to be constantly impressed upon local authorities, who are responsible for the removal of dust from our thoroughfares, as well as upon householders who are responsible for domestic organic dust.

Could strictly comparable statistics of the efficiency of scavenging in our great towns be obtained, they would, I am convinced, throw great light upon the relative incidence of epidemic diarrhoea. On this point I must draw attention to a very interesting experiment in local scavenging described by Dr. Spottiswoode Cameron in his annual report for 1892. (See page 165.)

E.—“The influence of soil is a decided one. . . . Where the dwelling-houses of a place have, as their foundation, solid rock, with little or no superincumbent loose material, the diarrhoeal mortality is, notwithstanding many other unfavourable conditions and surroundings, low. . . . On the other hand, a loose soil . . . is a soil on which diarrhoeal mortality is apt to be high” (Dr. Ballard's Report, page 3).

In connection with the statement of the experience of each town (pages 169 to 210) a sketch of the geology of the town has been attempted. The geological characters of a soil can only influence the prevalence of diarrhoea in so far as they affect its physical characters, its permeability to moisture and air, and its facility for the retention or removal of impurities, by natural or artificial means. (Given equal care in scavenging (using this term in its widest sense to indicate all artificial measures for the prevention or removal of organic pollution of the air or soil) in different towns, we should expect therefore that the most porous soils would have the most diarrhoea, in accordance with Dr. Ballard's dictum quoted above. To permeability of soil should, I think, be added *gradient*, as an important factor in its power of self-cleansing. In Table G these characteristics of the thirty-one towns in these two respects

are roughly stated. Although every attempt has been made to be accurate, it is possible that in this tabular statement a few inaccuracies may have occurred. I hope that in subsequent discussions more accurate statements on this point will be available, as in all such investigations great difficulties arise in securing vital statistics for districts which are strictly comparable. Thus, if we contrast the diarrhoeal experience of a wealthy population on a sandy soil with that of a poor population on a clayey soil, the social position (and what this connotes) of each population and the soil on which each population dwells would to a large extent counteract each other in reference to diarrhoea.

Table G shows that most of the towns with the lowest diarrhoeal mortality have impervious soils, though the converse scarcely holds good. Thus, Preston, Bolton, and Salford, with partially or completely impervious soils, have a high diarrhoeal mortality; while it is clear that in Halifax, with a largely pervious soil, good scavenging, or impervious paving, or some other factor, prevents the pollution of soil which is probably the important element in the causation of diarrhoea in towns on pervious soils. Steep gradients are mostly associated with a low diarrhoeal mortality. But these are mostly found in towns with a heavy rainfall, as we shall shortly see.

F.—Much can be said in favour of the view that differences as to rainfall and temperature explain the varying incidence of diarrhoea. I would go so far as to say that, given two towns equally placed as far as social and sanitary conditions are concerned, their relative diarrhoeal mortality is proportional to the height of the temperature and the deficiency of rainfall of each town, particularly the temperature and rainfall of the third quarter of the year. There is perhaps nothing new in this view, but it is important to crystallize it into a short statement, as I am confident that under present conditions of life there is an irreducible minimum of epidemic diarrhoea each year, the amount of which is dependent solely upon the uncontrollable climatic conditions enumerated above. Let me place in apposition to the above statement the statement of Dr. W. Johnston, formerly Medical Officer of Health of Leicester, who, after many years' experience of diarrhoea in its chief English home,* emphasized the view that meteorological conditions act only as excitants of the disease, in the following words: "I feel assured that if we could discover any particular town or district whose sanitary machinery was in perfect working order, the vicissitudes of climate would there be found to be perfectly harmless in the production of disease." He went on to state that under the then conditions "a continuance for a week or ten days of a mean daily

* *Lancet*, September 28, 1878.

temperature of 59° F. or over, in conjunction with a scarcity of rainfall and low degree of humidity of air, occurring during any period from the twenty-fifth to the thirty-seventh week of the year, is sufficient either to provoke the disease or to increase its prevalence." In theory we must agree with Dr. Johnston; a high temperature or deficient rainfall is not the *causa causans* of diarrhoea. This is a special micro-organism. But these climatic conditions play an indispensable part in the causation of diarrhoea as does the weather of summer in growing our cereal foods. The analogy may be pushed further. Neither the summer weather nor the actual seeds suffice for the summer crop of diarrhoea or of wheat, a suitable soil (in the former instance a polluted soil) being required for it to assume active virulence.

If temperature of air and deficiency of rainfall be such important factors in the causation of diarrhoea, a comparative examination of the towns in these respects may throw some light on our problem.

In Table H I have arranged the towns from which the information could be obtained in the order of their temperatures. In the first column is given the sum of the mean annual temperatures for 1891-98 inclusive; in the second the sum of the mean temperatures of the third quarter in each of the same years; in the third the sum of the annual rainfall; in the fourth the sum of the third quarters' rainfall for the same years; and in columns 5 and 6 are given the sum of the annual diarrhoeal death-rates and of the death-rates from diarrhoea in the third quarters of the years 1881-98.

Epidemic diarrhoea differs from diseases like diphtheria and rheumatic fever in that it becomes epidemically prevalent after a few weeks' persistence of the favouring climatic conditions; while I have elsewhere* shown that more than a single year's prevalence of the favouring climatic conditions is required for the production of a major epidemic of the latter diseases.

We may expect, therefore, that epidemic diarrhoea will, *ceteris paribus*, prevail in different towns, in the aggregate of a number of years, in proportion to their position in relation to temperature and rainfall. This point is tested in Table H.

The facts in Table H, dealing with the only fourteen great towns for which I could obtain a comparable series of observations, will be more comprehensible when these facts are stated as a percentage deviation from the average for all the towns. This is done in Table I.

It is clear that whether the records for the third quarter of the year or for the entire year are taken, the towns with the lowest

* See Milroy Lectures, *Lancet*, May 9th and 16th, 1895, and "Epidemic Diphtheria," p. 157 *et seq.*

Table H. - Towns arranged in Order of the Sum of Average Annual Temperatures, 1891-98.

SUM FOR THE YEARS 1891-98 INCLUSIVE OF

	Mean Annual Temperature of Air	Mean Temperature of Air in 3rd Quarter.	Mean Annual Rainfall	Mean Rainfall in 3rd Quarter.	Annual Death rate from Diarrhoea per 1,000 Births.	Death rate from Diarrhoea in 3rd Quarter per 1,000 Births.
	(1)	(2)	(3)	(4)	(5)	(6)
Brighton ...	399.0	478.5	217.3	56.8	913.0	713.5
London ...	398.5	484.6	177.5	51.9	773.5	582.0
Portsmouth ...	396.6	477.2	216.3	59.4	955.5	884.7
Norwich ...	391.1	466.0	200.0	55.0	1026.2	806.9
Liverpool ...	386.4	459.8	222.7	68.0	1176.5	874.4
Leeds ...	384.9	465.6	208.2	55.4	1135.1	919.1
Bristol ...	384.0	461.2	244.4	78.4	836.2	369.4
Bradford ...	383.8	460.4	228.4	57.8	1013.6	834.4
Nottingham ...	381.2	460.0	173.8	49.0	1171.4	888.6
Hull ...	378.4	454.3	205.8	56.4	1392.1	1217.7
Huddersfield ...	378.1	457.6	265.2	61.0	512.8	368.7
Oldham ...	374.0	462.0	313.3	90.5	817.4	512.5
Halifax ...	369.0	447.5	265.8	60.9	415.4	206.0
Wolverhampton ...	367.1	447.7	186.0	47.8	1340.2	1064.7
Sum of 14 years ...	5371.1	6482.4	3125.7	848.3	13279.8	10195.2
Average for 14 years ...	383.6	463.0	223.2	60.6	948.5	728.4

Table I. Towns arranged in the Order of their Diarrhoeal Death-rate.

PERCENTAGE DEVIATION FROM THE AVERAGE IN FOURTEEN TOWNS OF

	Death-rate from Diarrhoea.	Rainfall.	Mean Temperature of Air.	Death-rate from Diarrhoea.	Rainfall.	Mean Temperature of Air.
	In the 3rd Quarter of the Year 1891-98 inclusive.			In the Entire Year 1891-98 inclusive.		
Halifax ...	-71	+1	3	50	+20	-4
Huddersfield ...	49	+1	1	-46	+19	-1
Bristol ...	-49	+20	0	-38	+9	0
Oldham ...	-39	+50	0	14	+40	3
London ...	-20	14	+5	-18	20	+4
Brighton ...	2	6	+3	4	2	+4
Norwich ...	+11	-9	+1	+8	10	+2
Bradford ...	+15	4	0	+7	+3	0
Portsmouth ...	+19	2	+3	+1	3	+3
Nottingham ...	+19	-19	0	+23	22	1
Liverpool ...	+20	+12	1	+24	0	+1
Leeds ...	+20	-8	+1	+20	7	0
Wolverhampton ...	+45	21	3	+41	-17	4
Hull ...	+67	7	2	+47	8	1

diarrhoeal mortality have the greatest rainfall and the lowest temperature, and *vice versa*. In Table I the fourteen towns are given in the order of their death-rates from diarrhoea. All the towns with excessive rainfall (except Liverpool) and all the towns with low temperature (except Liverpool, Wolverhampton, and Hull) in the third quarter of the year have a low diarrhoeal mortality; while the converse is true for the towns with deficient rainfall and high temperature (except for rainfall in London and in Brighton). Similarly, for the entire year all the towns (except Bradford) with excessive rainfall, and all the towns with low temperature (except Wolverhampton and Hull), have a low diarrhoeal mortality; while the converse is true for the towns with deficient rainfall and high temperature (except London and Brighton).

The next point is whether any quantitative proportion can be detected between the above meteorological factors and the amount of diarrhoea. The answer is negative. Thus, Oldham, with a third quarter's excess of rainfall of 50 per cent., has more diarrhoea than three other towns. At the same time its mean temperature is slightly higher than two of these three. Similarly, Hull, with a deficiency of 7 per cent. of rainfall, has an excess of 67 per cent. of diarrhoea, as compared, for instance, with a deficiency of 8 per cent. of rainfall in Leeds, and an excess of diarrhoea of 26 per cent. Hull has the further advantage that its third quarter's mean temperature is 2 per cent. below, while that of Leeds is 1 per cent. above, the average.[†]

Liverpool is another interesting example: for with rainfall and temperature in its favour (less so for the whole year than for the third quarter) it has an excess of 20 per cent. of diarrhoea. On the other hand, both London and Brighton occupy a more favourable position than would be expected on meteorological grounds.^{*}

* For further remarks on Oldham, see pages 154 and 173.

† The Yorkshire series is particularly interesting. Arranged in order of rainfall in the third quarter, we have Halifax, Huddersfield (nearly equal), Bradford, Hull, Leeds, which, excepting Hull, is also the order of diarrhoea.

Meteorological observations for Preston in 1894 are lacking. As this town has the highest diarrhoeal mortality, I add the following comparative table for the seven years, 1891-98, omitting 1894:

SUM FOR THE YEARS 1891-93, 1895-98, INCLUSIVE OF

	Mean Annual Temperature of Air.	Mean Temperature of Air in 3rd Quarter.	Mean Annual Rainfall.	Mean Rainfall in 3rd Quarter.
Preston ...	346.0	418.0	235.7	81.6
Leeds ...	336.4	408.6	170.1	49.7
Bristol ...	335.9	405.7	203.7	67.2
Halifax ...	322.7	393.0	228.4	54.1

any change in scavenging, the diarrhoeal death-rate was the same as in the previous year.

G.—We are now in a position to summarize the evidence already adduced.

(a) It is clear that towns with a high temperature and a deficient rainfall, especially in the third quarter of the year, suffer severely from diarrhoea. This relationship is so close that the towns may be classified meteorologically in the order in which they ought to stand in reference to diarrhoea, and their true relative position as to domestic and municipal sanitation may be ascertained when we know whether they occupy a better or worse position on the list of towns than that which their meteorological place would indicate as rightly belonging to them.

(b) It is clear that among populations living on impervious and rocky soils diarrhoea is not so prevalent, probably because polluting faecal and other organic impurities do not cling to or soak into such soils.

(c) Diarrhoea is most prevalent where the systems of removal of sewage and house refuse are the least satisfactory. The exceptionally good position of certain towns in which pail-closets are largely used must be regarded as due to the favourable climatic and physiological position of these towns, probably aided by efficient municipal scavenging; and it is almost certain that their position might be still further improved by the general adoption of a water-closet system.

The fundamental condition favouring epidemic diarrhoea is *an unclean soil, the particulate poison from which infects the air, and is swallowed, most commonly with food, especially milk.*

In other words, epidemic diarrhoea is, like enteric fever, a "filth-disease." There are, however, certain points of contrast between the two diseases. In the Annual Summary of the Registrar-General for 1898 is a table giving the average death-rates for diarrhoea and enteric fever, 1888-97. This table shows that although some towns have a low diarrhoeal and a low typhoid mortality, *e.g.*, Croydon, Bristol, and Huddersfield, and the association of a high mortality from both diseases is also common, *e.g.*, Blackburn, Bolton, Preston, and Salford, there is no necessary association between the position of the towns in these two respects. Sunderland is worst (thirty-third) on the list for fever, only twenty-third for diarrhoea; Swansea is thirteenth for fever, third for diarrhoea; Brighton is second best for fever, only eighth among thirty-three towns for diarrhoea, and so on. The clue to the difference of incidence of the two diseases will, I think—apart from the fact that enteric fever is a disease more

* Supplement to the 1

particularly of adults, who are in the habit of taking infected foods, not eaten by infants—be found in the view that the causation of diarrhoea is most closely associated with surface pollution of the soil, that of enteric fever with less superficial pollution of the sub-soil from cesspools and leaky drains, as well as from privy-middens.

It will be noted that I have hitherto refrained from discussing the influence of artificial feeding of infants with cow's milk in the causation of diarrhoea. To many this will seem like the play of *Hamlet* without the Prince of Denmark. My silence is not due to non-recognition of the importance of this factor. Milk is, however, not the actual cause of diarrhoea. It is a vehicle of infection, just as mosquitoes are a vehicle of malaria, or rats of plague; and our ultimate research ought to be directed towards elimination—if it be practicable—of the actual conditions under which the contagia of these diseases are able to live. If we throw further light on these primal causes, we are in a better position to attack the vehicles of infection; and failing removal of the primal causes, we can then, to the best advantage, break the chain of causation at a point nearer the sufferer. If A = the favouring climatic conditions in the absence of which the contagium of diarrhoea does not multiply, B = the domestic and municipal cleanliness (removal and prevention of organic dust) which prevents the accumulation of this contagium, and C = the milk to which this contagium gains access, and along with which it enters the alimentary canal, B and C are evidently the factors of causation which we can hope most successfully to combat.

The question arises whether milk most commonly receives the contagium of diarrhoea at its source on the farm, in transit, or during delivery and storage at home. The last is, I believe, the most common point of infection, though the filthy conditions under which cows are commonly milked must largely help in the same direction.

Infants being suckled usually escape epidemic diarrhoea. This immunity is, so far as my local experience is concerned, not so absolute as might be expected—a fact which serves to emphasize the possibilities of infection by dust, apart from food. It is probable that much adult epidemic diarrhoea—which, although it does not figure largely in our death-returns, is extremely prevalent during hot summers—owes its origin similarly to the infected dust of our city streets and alleys, swallowed apart from food. Nor, although I cannot enlarge on this point, should the possibilities of personal infection be ignored. Multiple cases in the same house I have found to be fairly common; occasionally adults are infected by

infants, sometimes the reverse. When we remember how common are secondary and tertiary cases of enteric fever in houses where unskilled nurses are employed to nurse the first patient, it is not surprising that the same should hold good for diarrhoea.

These, and many other points which suggest themselves, must be left for further investigation. I have already exceeded the limits of my time and space. I venture to express the hope, in conclusion, that the present address may lead others to give more detailed facts relating to local experience and to the success attending local efforts at prevention of this disease, including methods of improved scavenging, better paving, reduction of dust in our streets, impervious paving of yards and alleys, the substitution of the water-carriage system for privies, and the municipal supply of sterilized milk, as in the interesting experiment at St. Helens. If during the present year's history of our Society each Branch were to invite and receive contributions on this subject, based on local experience or on special investigation, it would be found at the end of the year that we had done a piece of splendid work in the advancement of the public weal.

Halifax.

Physiography.—The town is divided into two by a brook. On one side the soil is impervious clay (population, 16,000) with a considerable dip to the brook. On the other the town is entirely built on pervious sandstone (millstone grit) of considerable depth, having a population of about 80,000. The gradients on this side of the

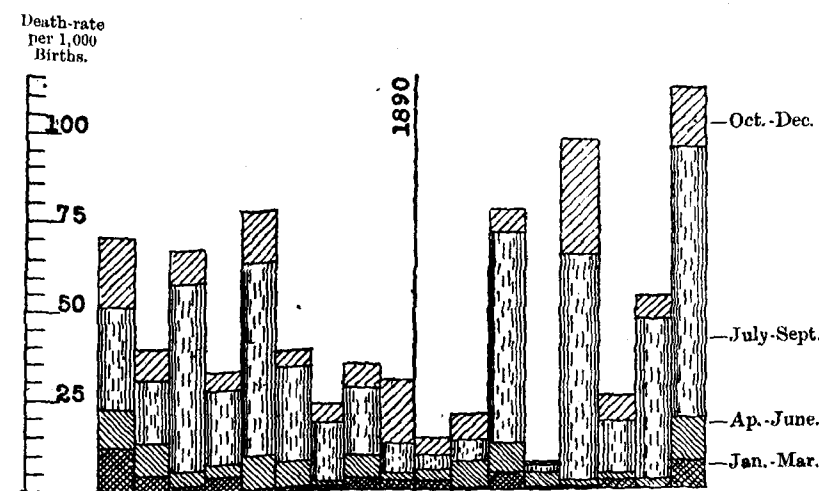


FIG. 2.—HALIFAX (1882-98).

Population estimated 1882 = 74,713.
 " " 1898 = 96,729.

stream are very gradual, and from west to east.—*Letter from Dr. Ainley, M.O.H.*

Conservancy System.—About 14,000 pails (Goux system), 4,000 w.c.'s, and 625 ashpits with privies.

Course of Diarrhoea.—The average annual death-rate, 1882-98,

was 12.4,* in the third quarter 30.3, per 1,000 births. The mortality in the lowest (first) forms 14 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the fifth, for the second the second, for the third the first, and for the fourth quarter the second, place among the towns in Table C. For the year as a whole it has the premier position among the great towns, there being a remarkably low mortality from both endemic and epidemic diarrhoea.

Huddersfield.

Physiography.—The greater portion of the town is situated upon layers of coal, ranging from thin coal and fireclay, through soft bed-

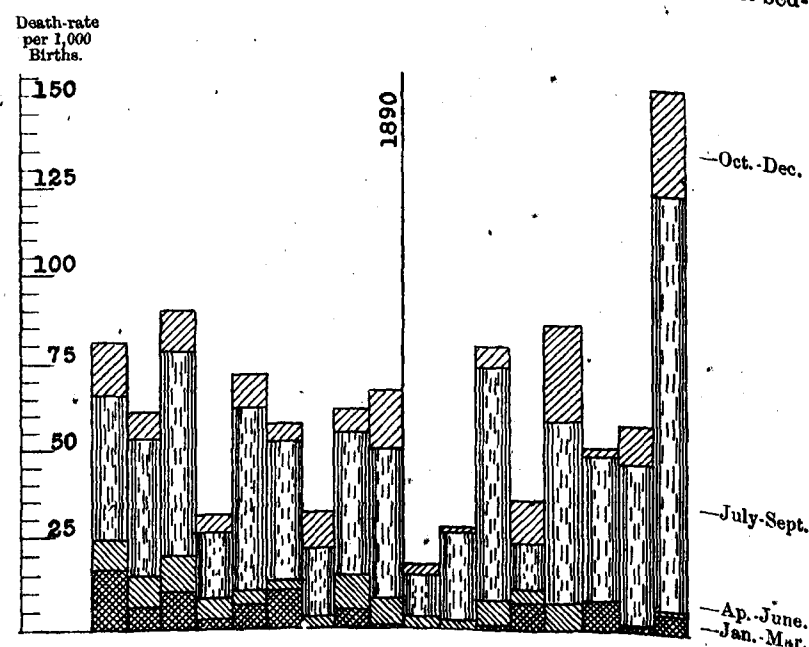


FIG. 3.—HUDDERSFIELD (1882-98).

Population estimated 1882= 83,418.
" " 1898=102,454.

flag, soft bed-coal, middle hard bed-coal, and rock, to the better bed-coal and fireclay strata, which are all comprised in the lower

* To avoid confusion, it may here be indicated that in each diagram (Figs. 2 to 32) the height of the column for each year, being the sum of the diarrhoeal death-rates for the four quarters of the year, is four times the annual death-rate from diarrhoea mentioned in Table C (page 146). See also remarks on page 149.

coal-measures or ganister beds of the carboniferous rocks. The remaining portion (population about 19,000) is upon sand, rock, flags, shales, and sandstone. Generally the former soil is somewhat impervious, the water being held more upon its surface by the clay overlying the coal, while the latter soil is drier. The gradients of the town are generally fairly steep, varying from about 150 feet above sea-level at Colne Bridge to about 1,000 feet at Castle Hill. The higher parts with the greater gradients are on sandstone, the lower parts on less pervious material, the greater part of the truly urban population being on the latter.—*Letter from Dr. Annis, M.O.H.*

Conservancy System.—Is chiefly a pail-closet town. In 1896 there were 15,000 pails, and 3,143 w.c.'s. The proportion of the latter is increasing.*

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 15.7, in the third quarter 42.6, per 1,000 births. The mortality in the lowest (first) forms 12 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the twelfth, for the second the first, for the third the third, and for the fourth quarter the fourth, place among the towns in Table C. Thus, there is remarkably little diarrhoea both of the endemic and the epidemic type. This has been the case throughout the years displayed in the diagram, the condition of the town *re* diarrhoea being almost stationary, if 1898 be excluded.

Bristol.

Physiography.—The old city is situated chiefly on low ground in a broad valley lined by the alluvial deposit of the river Avon. Parts of the city are upon higher ground on the new red sandstone (trias), through which rock the New Cut, or artificial course of the Avon, has been cut. The high tableland of Clifton, Cobham and Redland to the north and west of the city is situated upon the denuded edges of an arch of carboniferous rocks, upon which in certain limited areas beds of newer formation (*e.g.*, lias) lie unconformably. The steep ascents ascending from Granby Hill on the west past Brandon Hill to St. Michael's Hill and Marlborough Hill on the east are on the outcrop of the millstone grit.—*Dr. Davies, Annual Report, 1898.*

Thus, the greater part of the city is on comparatively impervious strata (*viz.*, alluvium and new red marl). There are many steep slopes in the city.

* Dr. Annis informs me that at present (1899) there are 12,604 tub closets, 4,742 fresh water-closets, 180 slop water-closets, 8,017 dry ashpits, and 1,209 privy middens in Huddersfield.

Conservancy System.—Entirely a w.c. town, and has been for a long time.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 18·8, in the third quarter 44·1, per 1,000 births. The mortality in the lowest (first) forms 15 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the seventeenth, for the second the eighteenth, for the third the fourth, and for the

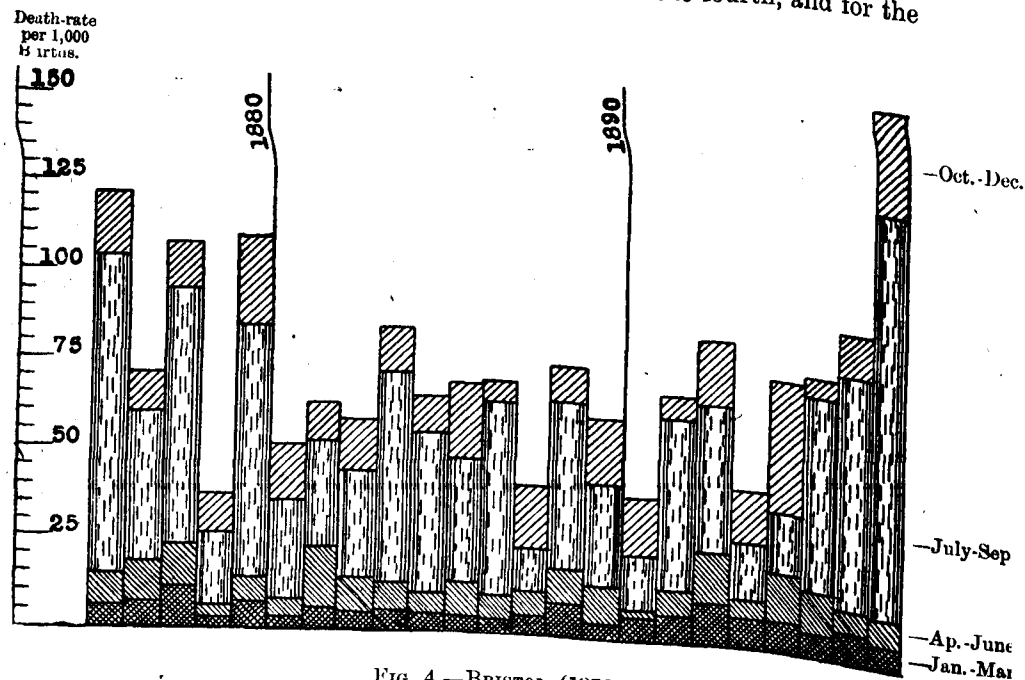


FIG. 4.—BRISTOL (1876-98).
Population estimated 1876=199,539.
" " 1898=316,900.

fourth quarter the twelfth, place among the towns in Table C. There is a relatively large amount of præ-epidemic and post-epidemic diarrhoea and very little epidemic diarrhoea. The amount of total diarrhoea has remained about stationary during the years shown in the diagram. Possibly there is a little increase, if allowance be made for alterations in nomenclature (see page 144). The same caution holds good for the diagrams giving the experience of every other great town.

Oldham.

Physiography.—Is situated chiefly upon the boulder clay with some sand, the deep strata consisting of rock shale. There are numerous faults. Generally speaking, the soil is described by Dr. Wilkinson, M.O.H., as being impervious. The gradients are high, varying from 354 feet to 1,225 feet above sea-level. Dr. Wilkinson adds that he attributes the freedom of Oldham from diarrhoea "to the elevation of the centre of the town causing a

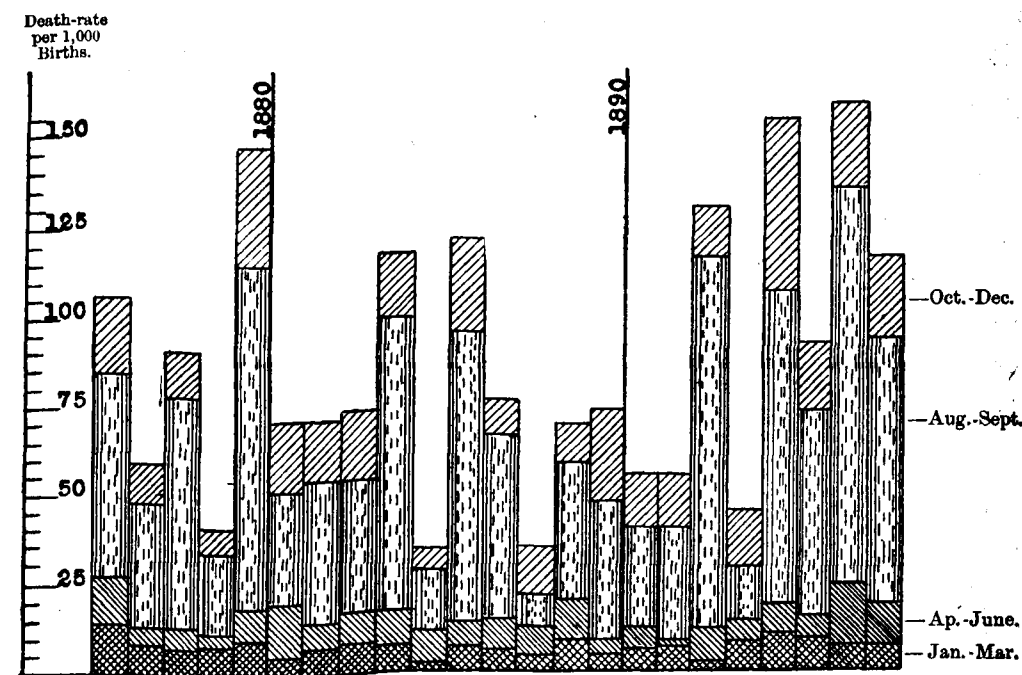


FIG. 5.—OLDHAM (1876-98).
Population estimated 1876= 88,609.
" " 1898=148,288.

natural drainage, and a cooler atmosphere and soil-surface. There is only a very small proportion of the town which may be considered flat. We are rather liable also to heavy storms of rain, which wash the surface of the ground, and are rapidly discharged into the sewers."

Conservancy System.—In July, 1899, the number of pails was 23,810; of iron tanks, cesspools, etc., 41; of water-closets, 1,797; of waste-water closets, 1,523; of trough-closets, 301.—Dr. Wilkinson.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 19.8, in the third quarter 46.1, per 1,000 births. The mortality in the lowest (first) forms 16 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the twenty-second, for the second the tenth, for the third the fifth, and for the fourth quarter the seventeenth, place among the towns in Table C.

Oldham occupies a relatively bad position for præ-epidemic and post-epidemic, and a remarkably good position for epidemic diarrhoea. It has deteriorated in recent years in respect of total diarrhoea.

Edinburgh.

Physiography.—It is chiefly built on boulder clay, an impervious stratum. The gradients are very steep, especially in the Old and New Town; the slopes of the outlying suburbs are also good, but not

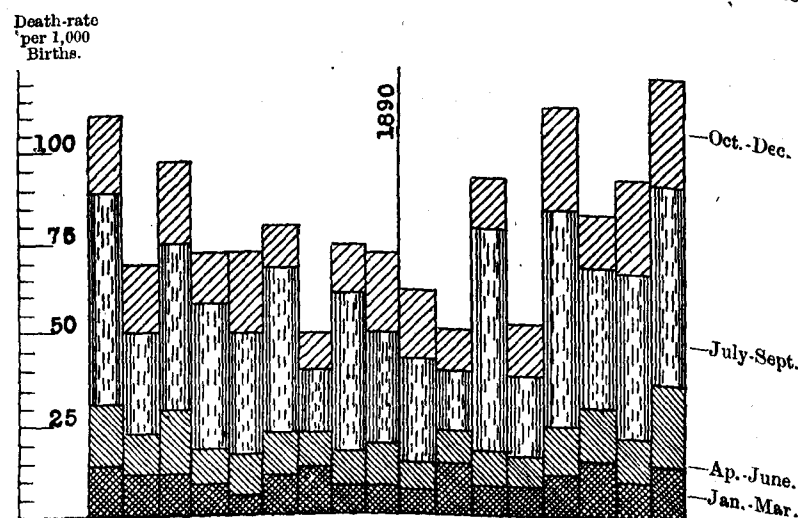


FIG. 6.—EDINBURGH (1882-98).

Population estimated 1882=232,440.
" " 1898=295,628.

so steep as the above. In the older and less sanitary parts of the town the gradients are very steep.—Dr. H. Littlejohn.

Conservancy System.—Water-closets are almost universal.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 20.9, in the third quarter 42.2, per 1,000 births. The mortality in the lowest (first) forms 25 per cent. of that in the highest (third)

quarter of the year. For the first quarter it occupies the twenty-eighth, for the second the twenty-third, for the third the second, and for the fourth quarter the twenty-first, place among the towns in Table D. It is clear that there is an excess of præ-epidemic and post-epidemic diarrhoea, and that in respect of epidemic diarrhoea only Halifax has so small an amount among the thirty-one towns in Tables C and D. A slight deterioration *re* diarrhoea is indicated in the diagram.

Plymouth.

Physiography.—It stands upon the slate and limestone of the middle Devonian series. The limestone rocks are compact in themselves, but broken by joints and fissures. The slate and rocks vary

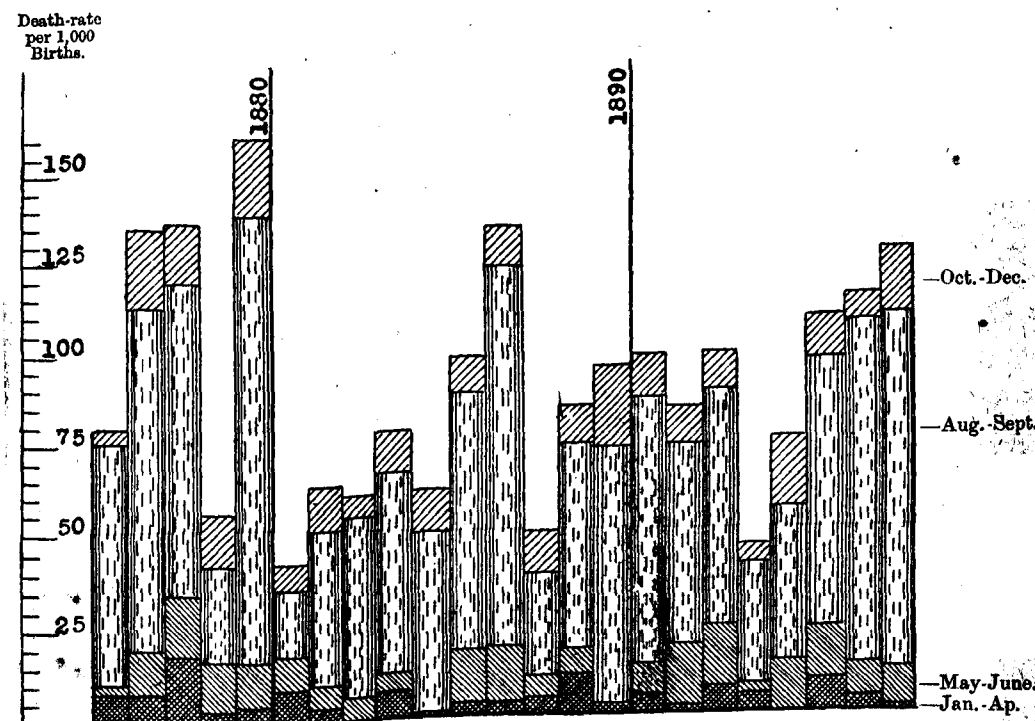


FIG. 7.—PLYMOUTH (1876-98).

Population estimated 1876=72,230.
" " 1898=99,136.

considerably in character, from the loose broken material, locally known as "shillet," to the compact red and purple slates. As a rule, however, the slate rocks admit freely of percolation. The gradients are not very great, the highest point, a portion of a

recently-added area, being 200 feet above sea-level, and the slope being gradual towards the sea.—*Dr. Williams, Annual Report, 1898.*

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 22.3, in the third quarter 64.7, per 1,000 births. The mortality in the lowest (first) forms 6 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the third, for the second the fourteenth, for the third the eighth, and for the fourth quarter the sixth, place among the great towns in Table C. The condition of Plymouth has remained fairly stationary throughout the period embraced by the diagram.

Newcastle-upon-Tyne.

Physiography.—It is situate entirely on the coal-measures. The greater part of the drift is boulder clay, with occasional glacial gravel and pebble beds. The gradients in the city are good.

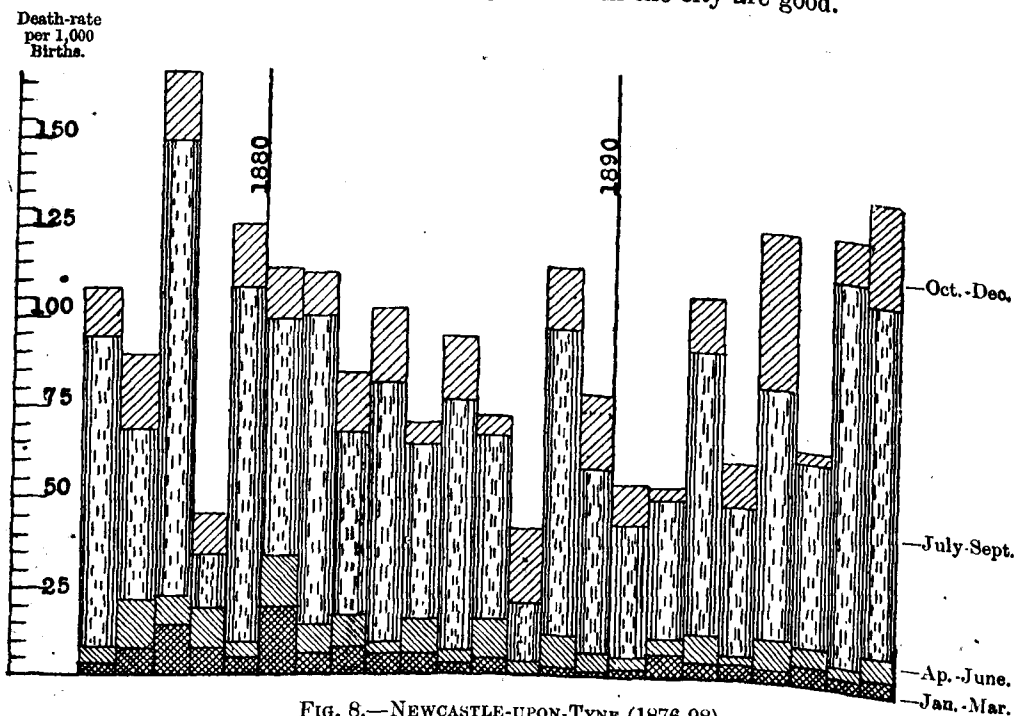


FIG. 8.—NEWCASTLE-UPON-TYNE (1876-98).

Population estimated 1876=139,929.
" " 1898=223,021.

Conservancy System.—5,346 pail-closets in 1897, as compared with 2,535 in 1888, 2,730 privy middens in 1897, as compared with 6,047 in 1888, also a preponderant number of w.c.'s.—*Dr. Armstrong, Annual Report, 1898.*

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 22.4, in the third quarter 62.8, per 1,000 births. The mortality in the lowest (first) was 7 per cent. of that in the highest (third) quarter of the year. For the first quarter Newcastle occupies the eighth, for the second quarter the fourth, for the third quarter the seventh, and for the fourth quarter the thirteenth, place among the thirty-one towns in Table C. The amount of præ-epidemic diarrhoea is comparatively small. The city has remained about stationary *re* diarrhoea. Its experience in 1879 and in 1888 may be compared advantageously with that of other towns.

Derby.

Physiography.—*Dr. Howarth, M.O.H., states:* In the Valley of the Derwent the formation is alluvium; on each side of the valley

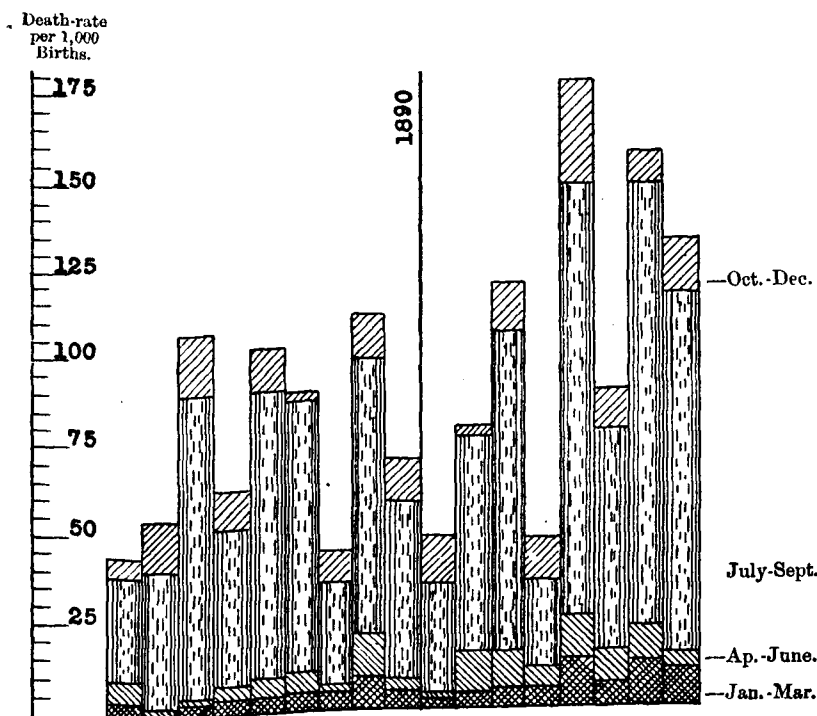


FIG. 9.—DERBY (1882-98).

Population estimated 1882= 83,587.
" " 1898= 104,834.

are the upper Keuper series of rocks, overlying which is a red marl. There is a limited amount of sandstone in places. With the exception of the valley, the whole town is practically on the same

kind of soil. The gradients are variable, the highest point of the borough being 325 feet, and the lowest 142 feet, above sea-level.

Conservancy System.—There were in 1894 7,275 midden privies, 4,777 pails, 7,520 w.c.'s, and 318 trough-closets. A gradual conversion of privies is going on, 129 being changed into w.c.'s in 1898.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 22·6, in the third quarter 67·2, per 1,000 births. The mortality in the lowest (first) forms 8 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the fourteenth, for the second the third, for the third the ninth, and for the fourth the seventh, place among the towns in Table C. The diarrhoea is chiefly of the epidemic type, and the town has somewhat deteriorated during the time under observation.

Birkenhead.

Physiography.—The ground is fairly flat towards the east or river side of the town, rising gradually westward to a height of 230 feet

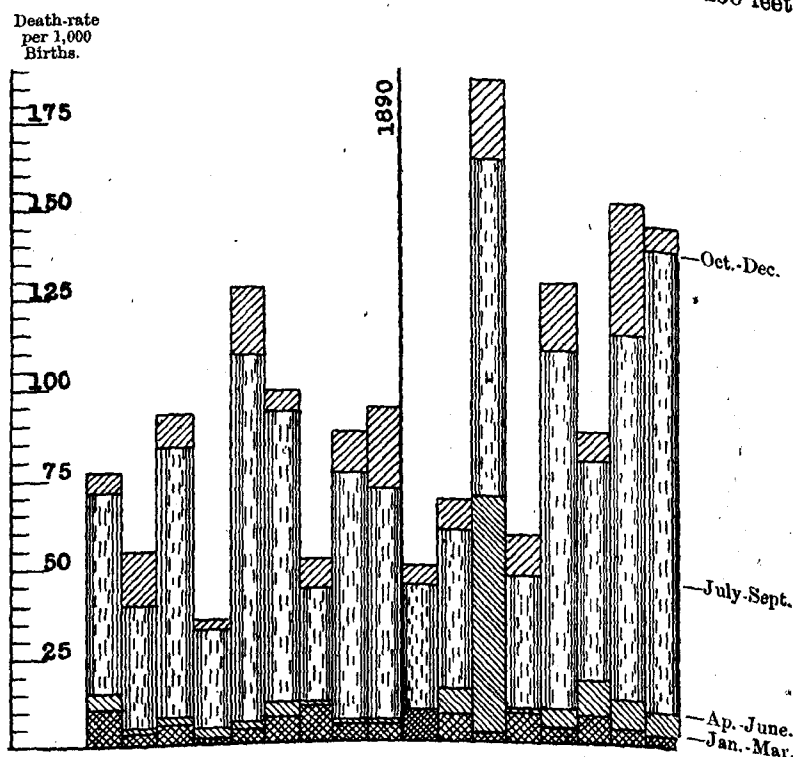


FIG. 10.—BIRKENHEAD (1882-98).

Population estimated 1882= 86,582.

" " 1898=113,189.

above Ordnance datum. The district is chiefly on sand, on the top of Keuper rock, with faults here and there of boulder clay upon pebble-beds. Underlying the whole is a stratum of red sandstone at a considerable depth, from which the water-supply is obtained.—*Dr. Marsden, M.O.H.*

Conservancy Arrangements.—In 1899 there are 500 midden privies, mostly in the outlying parts of the borough, and 20,000 w.c.'s.—*Dr. Marsden.*

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 23·2, in the third quarter 68·6, per 1,000 births. The mortality in the lowest (first) forms 8 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the fifteenth, for the second the eleventh, for the third the twelfth, and for the fourth quarter the third, place among the towns in Table C. The diarrhoea is chiefly of the epidemic type, and the town has deteriorated in regard to this disease.

London.

Physiography.—The subsoils of London are complex, and it is impossible to state the proportion of population living on pervious and impervious strata. Along the banks of the Thames there is considerable alluvium. A large part of old London and the villages now compacted in modern London were built on tracts of valley gravel and loam, the loam or brick-earth forming a practically impervious covering over a considerable portion of the gravel. The greatest extension of modern London has been on to impervious clay, branching out from the old gravel-beds, from which well-water was obtainable. (For details see "Soils and Subsoils," by H. B. Woodward, F.R.S.: "Memoirs of the Geological Survey," 1897, 2s. 6d.)

Conservancy System.—Almost entirely water-carriage.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 23·3, in the third quarter 70·8, per 1,000 births. The mortality in the lowest (first) formed 7 per cent of that in the highest (third) quarter of the year. For the first quarter London occupies the ninth, for the second the eleventh, for the third the thirteenth, and for the fourth quarter the first, place among the thirty-one towns in Table C. London occupies a fairly stationary position as regards total annual diarrhoea.

In view of the fact that London is rather a province of houses than a single town, it becomes necessary to study the incidence of diarrhoea within it in further detail. For this purpose, in order to obtain a sufficiently long series of years, it has been necessary to take registration and not sanitary districts; and no attempt has

been made to state separately the diarrhoeal death-rate for each quarter of the year. The diagrams relating to the thirty registration districts of London are not given here, from considerations of space and expense. In the absence of diagrams it is difficult to bring out the salient features of the diarrhoeal mortality of London, and only a few can be indicated. The figures deal with the years 1891-98 inclusive.

Of the *western districts*, Westminster occupies the best position. St. George, Hanover Square, is a bad second; Paddington and Kensington come third; while Fulham and Chelsea are fourth in order of increasing mortality. It would be interesting to know what

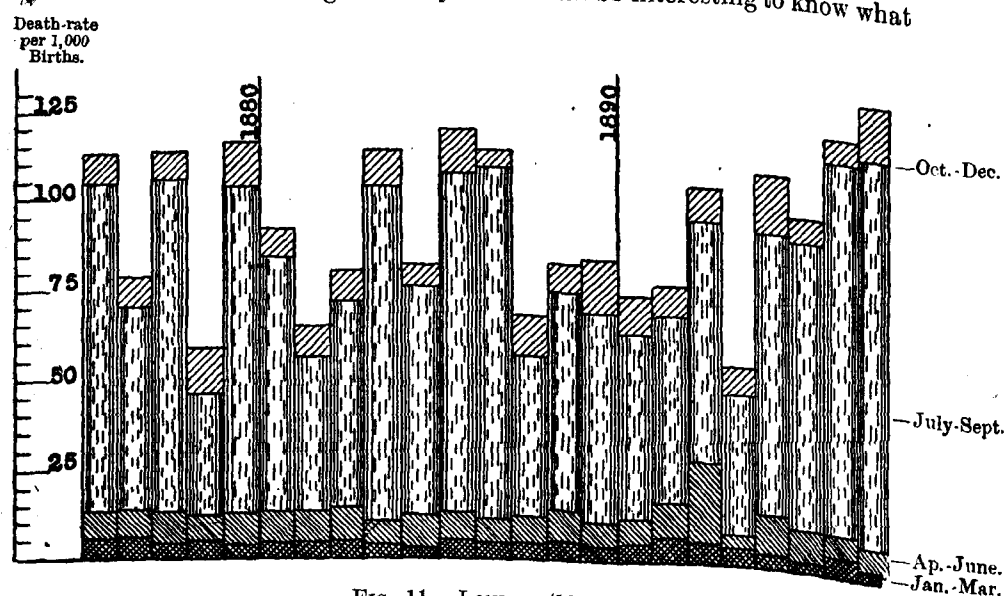


FIG. 11.—LONDON (1876-98).

Population estimated 1876=3,537,314.
" " 1898=4,504,766.

local conditions (milk-supply, local scavenging, or other) caused Fulham to suffer more in 1898 than in 1897, while all the other western districts (except Westminster) showed a decrease.

St. Giles is the best of the *central districts*. The City is a poor second. Holborn comes next. The steady and uninterrupted increase in the four years 1895-98 requires explanation, and the even more rapid increase in the Strand district is remarkable.

Of the five *northern districts* Hampstead occupies the premier position, but Marylebone is a good second. Hackney and St. Pancras follow close after Islington. There are curious differences among the three last-named districts. The year 1896 was a very

bad year for Hackney. It reached its maximum for diarrhoea in that year, there being a slight improvement in 1897 and 1898. On the other hand, in St. Pancras there was less diarrhoea in 1896 than in 1895 or 1897-98; while Islington suffered a very striking increase in 1898 over the three preceding years. It is open to surmise that there are artificial differences caused by vagaries of death-certification; but my opinion is that, after making free allowances for these, real differences are indicated by the above facts, which a full knowledge of facts of local experience and sanitary administration might enable us to explain.

The seven *eastern districts* show greater variations in diarrhoeal mortality. Whitechapel has an extremely good record. Judging by the diagram (without calculating an average death-rate), it is only surpassed throughout London by Westminster. Is this due to an excessive proportion of Jew infants in the population? Bethnal and Mile End make good seconds, whilst Poplar is but little worse. Shoreditch and St. George-in-the-East have a much larger amount of fatal diarrhoea. Stepney has an equal amount, and is further remarkable for the fact that in 1898 it had more than double the amount of diarrhoea in any preceding year. What special local circumstance accounted for this? The eastern districts show another peculiar difference among themselves. In Whitechapel and St. George-in-the-East there is much less variation in the yearly incidence of diarrhoea than in other districts.

St. Saviour's and St. Olave's, *Southwark*, have about an equal amount of total diarrhoea; but in St. Saviour's the amounts in 1897 and 1898 were nearly equal, while in St. Olave's there was a great decline in 1898.

Of the more *southern districts* Woolwich has the best record, though its position is deteriorating. In Lewisham and Greenwich the 1897-98 incidence of diarrhoea was even greater. The amounts of diarrhoea in Lambeth, Camberwell, and Wandsworth were about equal.

Glasgow.

Physiography.—The following information, furnished by Professor Young, of Glasgow University, is forwarded by Dr. Chambers, the Medical Officer of Health of the City of Glasgow: From the river on either side stretches an alluvial flat of considerable depth. The horizontal stratification is interrupted only by drains and gas-pipes, but even without these artificial drainage lines the whole may be described as fairly dry; there is no "retentive stratum" in it. "Rising from the level of George Square, the sand and gravel thin,

but it is only on the summit, as of Gilmorehill, that the boulder clay is actually at the surface. Even here there was a thin coating of sandy gravel (1865).

"Along Byres Road and Western Road the carboniferous strata come close to the surface, but their area does not give them importance; besides, their dip is enough to make them good drains. The Necropolis and its shoulders stand out of the boulder clay; passing east from it, you come upon the thin sandy soil thickening into the sand and gravel which cover the boulder clay all round Glasgow—one may say from the high ground back of

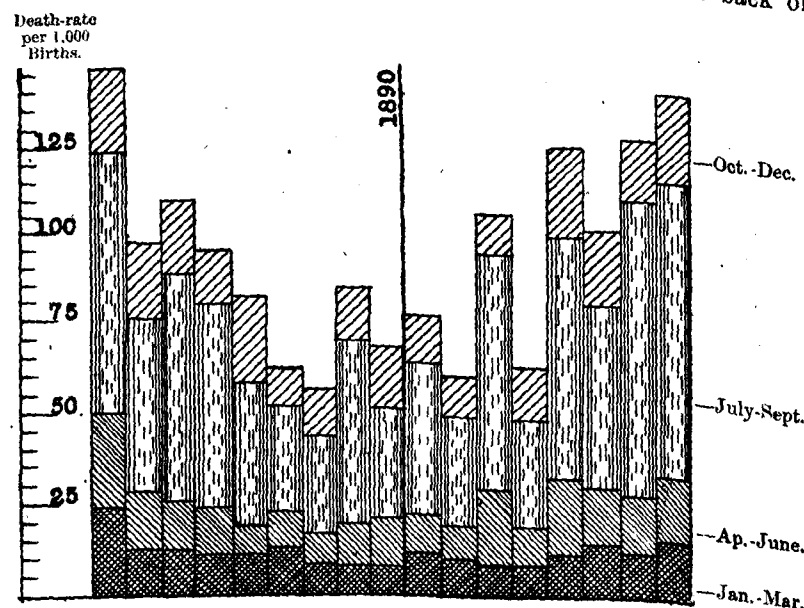


FIG. 12.—GLASGOW (1882-98).

Population estimated 1882=514,048.
" " 1898=724,349.

Paisley across to Kirkintilloch, etc.—then the boulder clay at various depths. North to Springburn the boulder clay comes to the surface more extensively, and the rock is not far off; pass Springburn, and the sand and gravel resume.

"Surface geology medicine is recent, and I have not followed it closely, but in the case of Glasgow I do not think you will find in soil any determining cause. If the soil does anything in the medical line, it does the same thing over the district generally. For special manifestations in particular places, special local explorations might discover pool-like depressions of the boulder clay, or of the sand gravels—local swamps, in short. These are sometimes helped or

created by neglect of the Building Act, which bars 'free coups' as building sites for, I think, fourteen years. There have been districts of Glasgow copious in enteric disorders, in which old quarries figured, burns and cesspools contributing. Queen's Crescent I heard of forty years ago as a lucrative but unhealthy building locality, now, I suppose, above suspicion in this respect.

"What I mean is, there is so great uniformity of soil conditions on the south side and over the north in great part, that special manifestations are more likely to belong to local accidents or to point to human blunders."

Conservancy System.—Chiefly a w.c. town, w.c.'s having replaced in a large measure midden privies. Many w.c.'s are used in common by several tenants. Number of privies and pails unknown, but rapidly decreasing. Pails are scavenged daily.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 23.9, in the third quarter 51.7, per 1,000 births. The mortality in the lowest (first) formed 23 per cent. of that in the highest (third) quarter of the year. For the first quarter Glasgow occupies the twenty-ninth, for the second quarter the twenty-seventh, for the third quarter the sixth, and for the fourth quarter the eighteenth, place among the thirty-one towns in Table C. There is, on the whole, no improvement in the present condition of Glasgow *re* diarrhoea compared with its past experience. The total amount, however, is very small as compared with that in the large English cities. Another interesting feature is the excessive amount of præ-epidemic, and the very small amount of epidemic, diarrhoea. It shares this feature with Edinburgh, Bristol, and, to a less extent, with other towns. (See also page 148.)

Cardiff.

Physiography.—The southern half of the borough is on alluvial and marine clay, very impervious. The northern half is gravel. The clay is of great depth towards the docks and shore, thinning off towards the gravel. Underneath the clay is a gravel and sand bed of considerable thickness, which appears at the surface in the northern part of the borough. Underneath the gravel and clay are impervious strata of various kinds, carboniferous, old red sandstone, or silurian. Three rivers run through Cardiff into the Bristol Channel, the Taff through the centre, the river Romney forming the eastern, and the river Ely the western, boundary of the borough. The population in the southern part of the borough is more largely adult than that to the north.—*Letter from Dr. Walford, M.O.H.*

Conservancy System.—Entirely a w.c. town.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 24·6, in the third quarter 68·1, per 1,000 births. The mortality in the lowest (first) was 9 per cent. of that in the highest (third) quarter of the year. For the first quarter Cardiff occupied the sixteenth, for the second quarter the fifteenth, for the third quarter

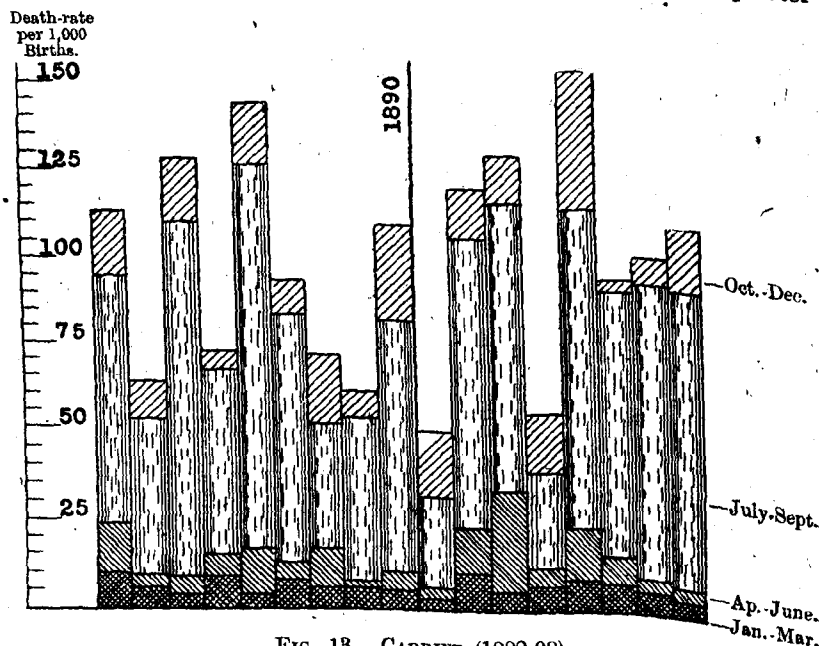


FIG. 13.—CARDIFF (1882-98).

Population estimated 1882=86,724.
 " " 1898=177,770.

the eleventh, and for the fourth quarter the eleventh, place among the thirty-one towns in Table C. The diarrhoeal mortality has, if allowance be made for adverse meteorological conditions in recent years, probably slightly improved. Cardiff occupies a slightly more favourable position for epidemic than for præ- or post-epidemic diarrhoea.

Brighton.

Physiography.—Is built mainly on the pervious chalk, with coombe rock in the lower parts—i.e., a mixture of flints and chalk, which is even more pervious than chalk. The subsoil water is very low. The town lies mainly on the steep slopes of two hills, and on somewhat less steep declivities sloping southward to the sea.

Conservancy System.—Entirely water-carriage. Every house is supplied with w.c.'s, and is drained to the main sewer. All cesspools have been abolished.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 27·6, for the third quarter 87·0, per 1,000 births. The mortality in the lowest (first) formed only 4 per cent. of that in the highest (third) quarter of the year. For the first quarter Brighton occupied

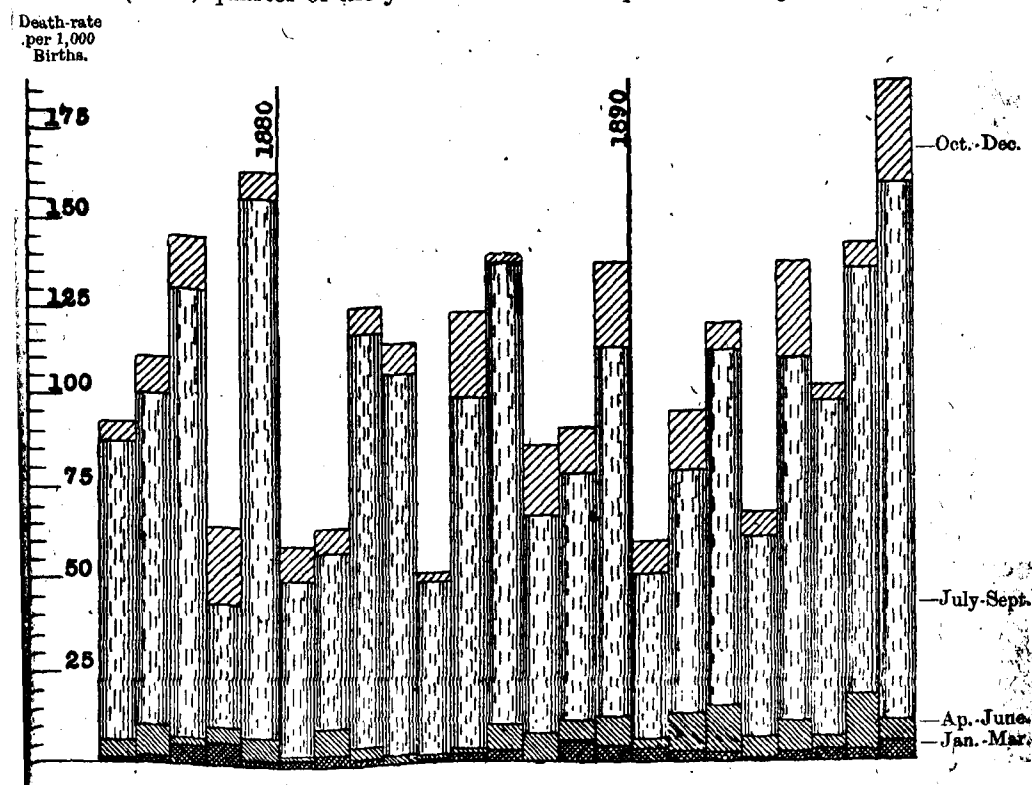


FIG. 14.—BRIGHTON (1876-98).

Population estimated 1876=100,632.
 " " 1898=122,310.

the second (being surpassed by Norwich), for the second quarter the fifth, for the third quarter the fourteenth, and for the fourth quarter the ninth, place among the thirty-one towns in Table C. The diarrhoea is chiefly of the epidemic type.

Dublin.

Physiography.—Is built on boulder clay and limestone gravel. In 1891, 169,615 people lived on the clay, and 75,486 on the gravel. In the gravel the ground-water is from 14 to 18 feet below the surface of the ground, in the clay 5 to 6 feet only. The gravel lies near the river Liffey, which flows through the centre of the city, the clay occupying the higher parts of the city.—Sir C. Cameron.

Conservancy System.—Is almost entirely a w.c. town. Sir C. Cameron stated in his annual report for 1894 that until recently there existed in Dublin middens in large numbers, with consequent organic pollution of the soil, from the effects of which the soil has not yet had time to recover. Dublin is low-lying, the greater part of it being built upon a water-logged site, where the subsoil is only drained when the tide is out.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 28.1, in the third quarter 67.8, per 1,000 births. The mortality

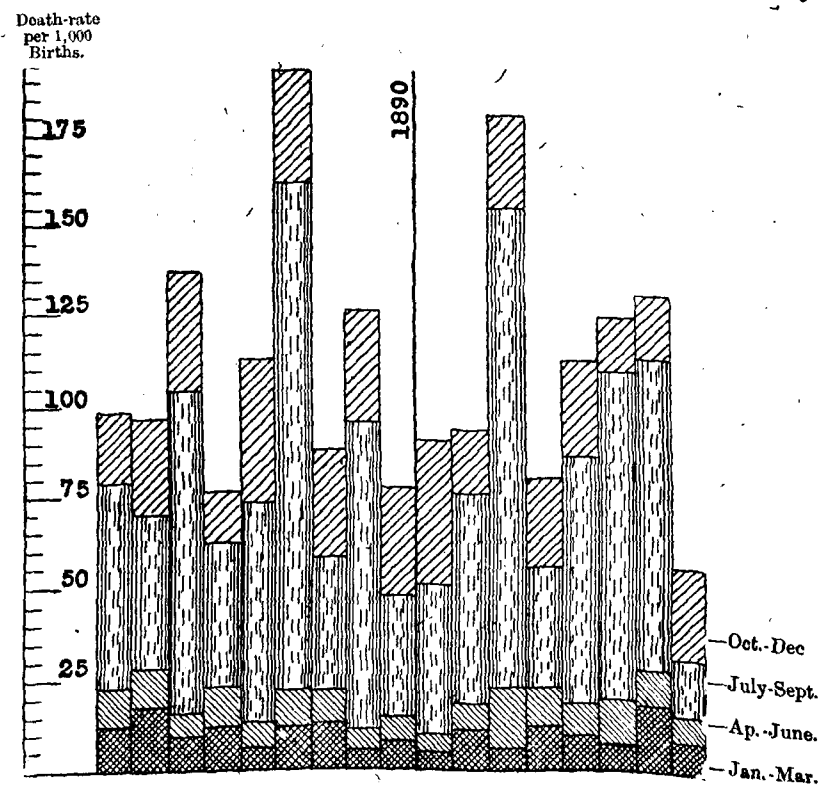


FIG. 15.—DUBLIN (1882-98).

Population estimated 1882 = 348,293.
" " 1898 = 345,594.

in the lowest (first) forms 14 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the twenty-sixth, for the second the twentieth, for the third the tenth, and for the fourth quarter the twenty-eighth, place among the thirty-one towns in Table C. If 1898, which was curiously low, be excluded, the diarrhoeal death-rate may be regarded as almost stationary. It

is among the towns with a large proportional amount of endemic diarrhoea, the amount of post-epidemic diarrhoea being particularly high.

Portsmouth.

Physiography.—Is chiefly built on gravel, and the greater part only 15 feet above sea-level. Is very flat. Here and there are stretches of loam, but this is so thin that the foundations of the houses are on the gravel. The subsoil water is only a few feet from the surface.

Conservancy System.—Nearly all the houses have w.c.'s. A large number of these are without efficient flushing-cisterns.

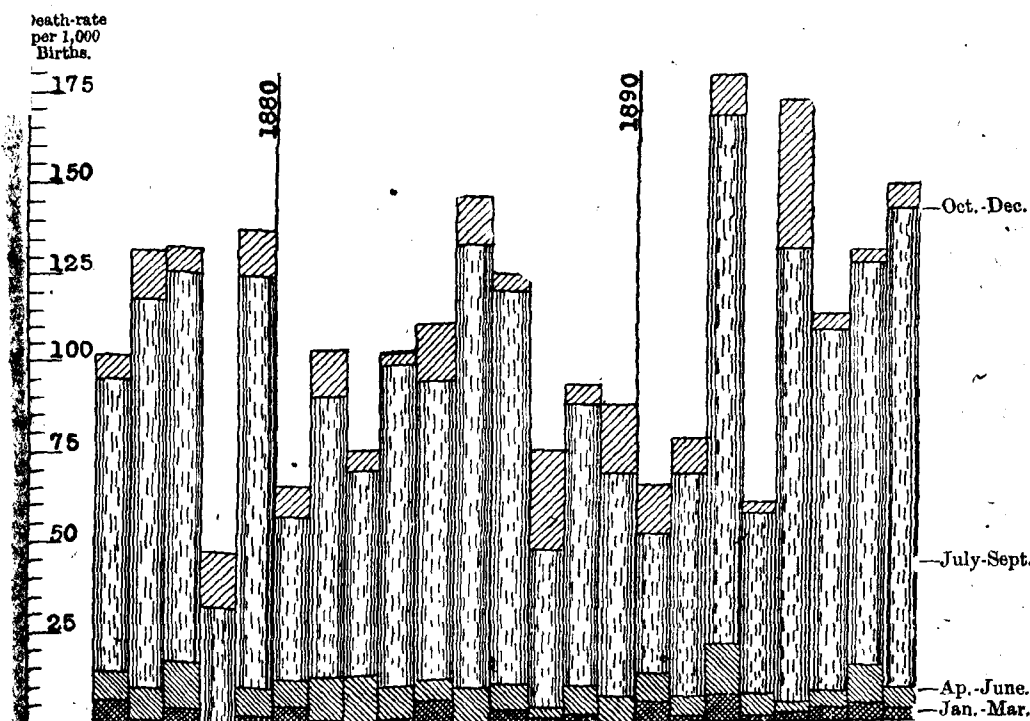


FIG. 16.—PORTSMOUTH (1876-98).

Population estimated 1876 = 124,867.
" " 1898 = 186,618.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 31.4, in the third quarter 102.0, per 1,000 births. The mortality in the lowest (first) formed 4 per cent. of that in the highest (third) quarter of the year. For the first quarter Portsmouth occupies the fourth, for the second the ninth, for the third the nineteenth, and for the fourth quarter the fifth, place among the thirty-one towns

enumerated on page 147. The amount of diarrhoea has remained about stationary during the period embraced in the chart. The diarrhoea is chiefly of the epidemic type.

Sunderland.

Physiography.—The subsoil consists of an impervious layer of boulder clay, varying from a few feet to 100 feet in depth. This clay, as a rule, is simply covered by a layer of clayey soil, but in

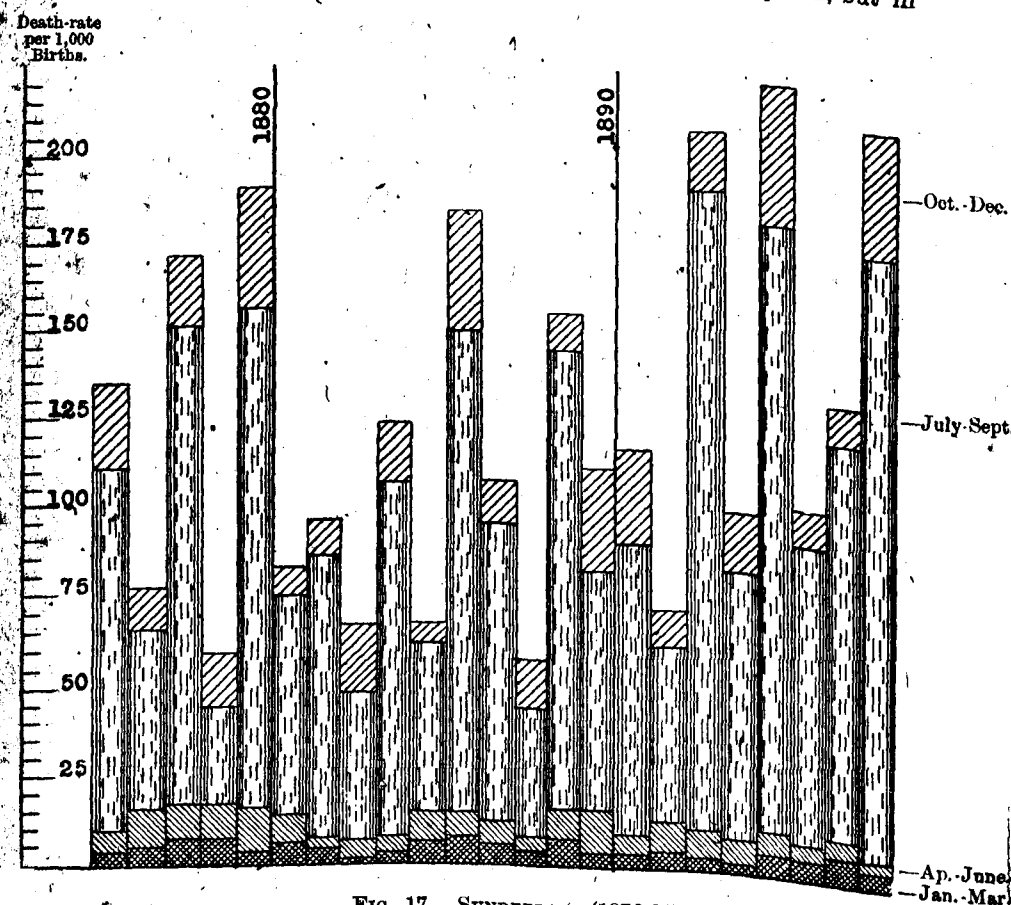


FIG. 17.—SUNDERLAND (1876-98).
Population estimated 1876=108,843.
" " 1898=143,849.

certain parts of the district, over limited areas, beds of sand or gravel overlie the clay. Monkwearmouth is situated on one of these sand or gravel beds, and it shows the greatest mortality from diarrhoea and enteritis. The gradients are slight, the town being chiefly built on a flat plain.—*Dr. Scurfield, Annual Report, 1897.*

Conservancy System.—2,760 houses have w.c.'s only, 850 of these with privies and ashpits; 425 have w.c.'s with ash-closets; 11,160 have privies and ashpits, 4,660 ash-closets, and 800 pan-closets, and 75 no conveniences at all.—*Dr. Scurfield, Annual Report, 1898.*

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 31.7, in the third quarter 97.0, per 1,000 births. The mortality in the lowest (first) forms 5 per cent. of that in the highest (third) quarter of the year. For the first quarter of the year it occupies the seventh, for the second the sixth, for the third the seventeenth, and for the fourth quarter the twentieth, place among the thirty-one towns in Table C. It occupies a good position so far as the first and second quarters of the year are concerned, but a bad position for the third quarter, the amount in this quarter having increased in recent years. It is among the towns especially susceptible to the conditions producing epidemic diarrhoea, as evidenced by the high peaks in the diagram.

Norwich.

Physiography.—The higher levels in the city are made up of glacial gravels, through which the valleys have been excavated, exposing at their margins the crag formation and chalk, while gravel and alluvial deposit occupy the lower ground. The chalk, which at Norwich is over 1,000 feet thick, and underlies the whole of the city, comes to the surface in several places within the city, and may be reached at no great depth at all parts of the municipal area.—*Dr. Pattin, Annual Report, 1897.* The gradients are good. The soil is generally pervious. One-fifth of the population are on the low-lying alluvium, with subsoil water about 3 feet from the surface, the rest on the chalk on gradients which are good.

Conservancy System.—About 25 per cent. of houses have w.c.'s, rather over 25 per cent. have pail-closets, and the remainder "bins" or middens.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 32.4, in the third quarter 103.0, per 1,000 births. The mortality in the lowest (first) forms only 3 per cent. of that in the highest (third) quarter of the year. For the first quarter of the year it occupies the first, for the second the seventh, for the third the twenty-second, and for the fourth quarter the fourteenth, place among the thirty-one towns in Table C.

There is very little præ-epidemic The amount of epidemic diarrhoea is great, and subject to great fluctuations, as in 1880, 1884, and 1886. There has been some improvement, the

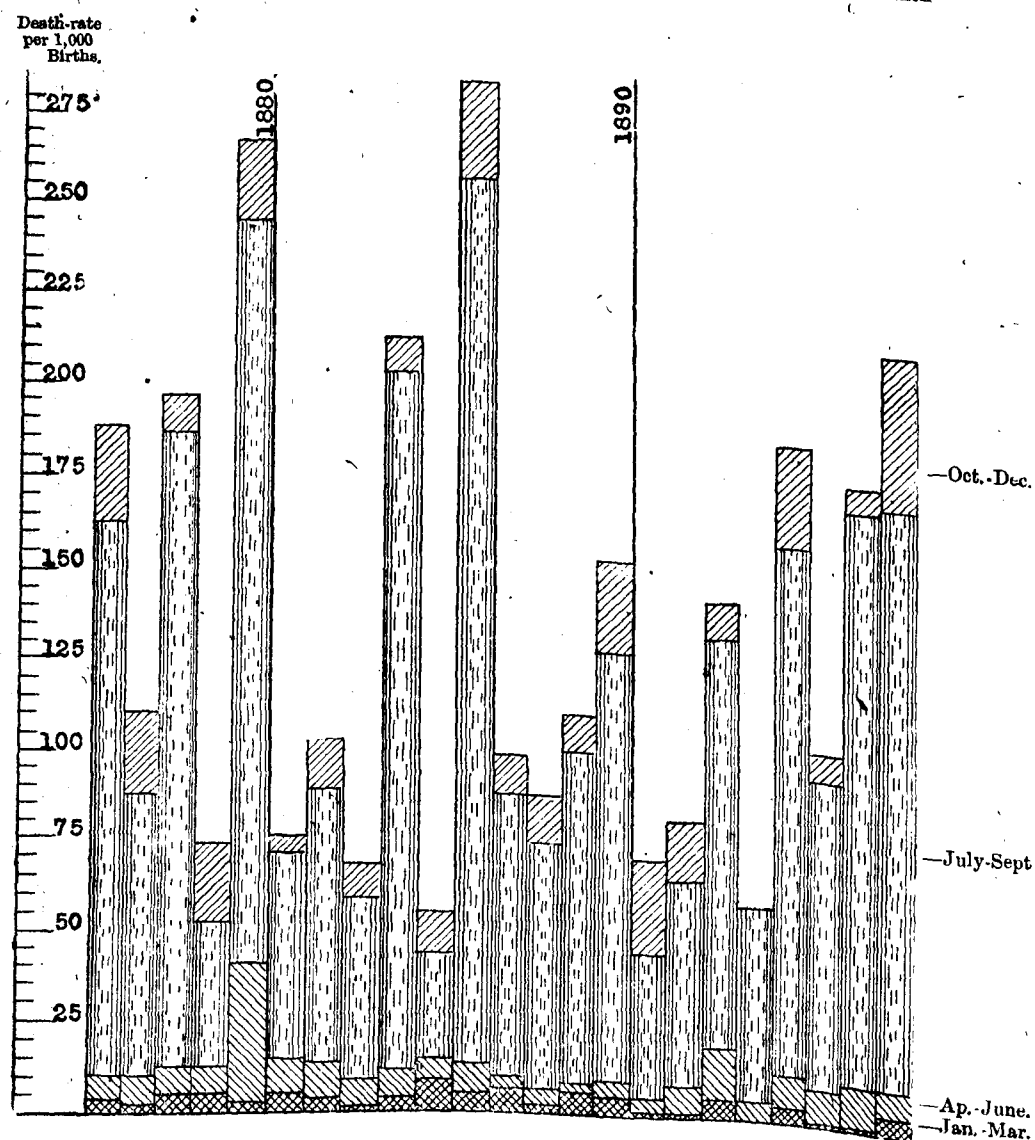


FIG. 18.—NORWICH (1876-98).

Population estimated 1876 = 83,430.
 " " 1898 = 111,699.

recent hot summers not having been so productive of diarrhoea as similar summers in the past. (See remarks on page 148 *et seq.*)

Manchester.

Physiography.—The greatest part of Manchester is built upon marl, a mixture of sand, gravel and clay, overlying the new red sandstone.

The information on page 145, furnished by Dr. Niven, gives more detailed information.

Conservancy System.—There are in the city pail-closets, 76,663; ash-boxes, 56,824; midden privies, 22,935; wet middens, 12,161;

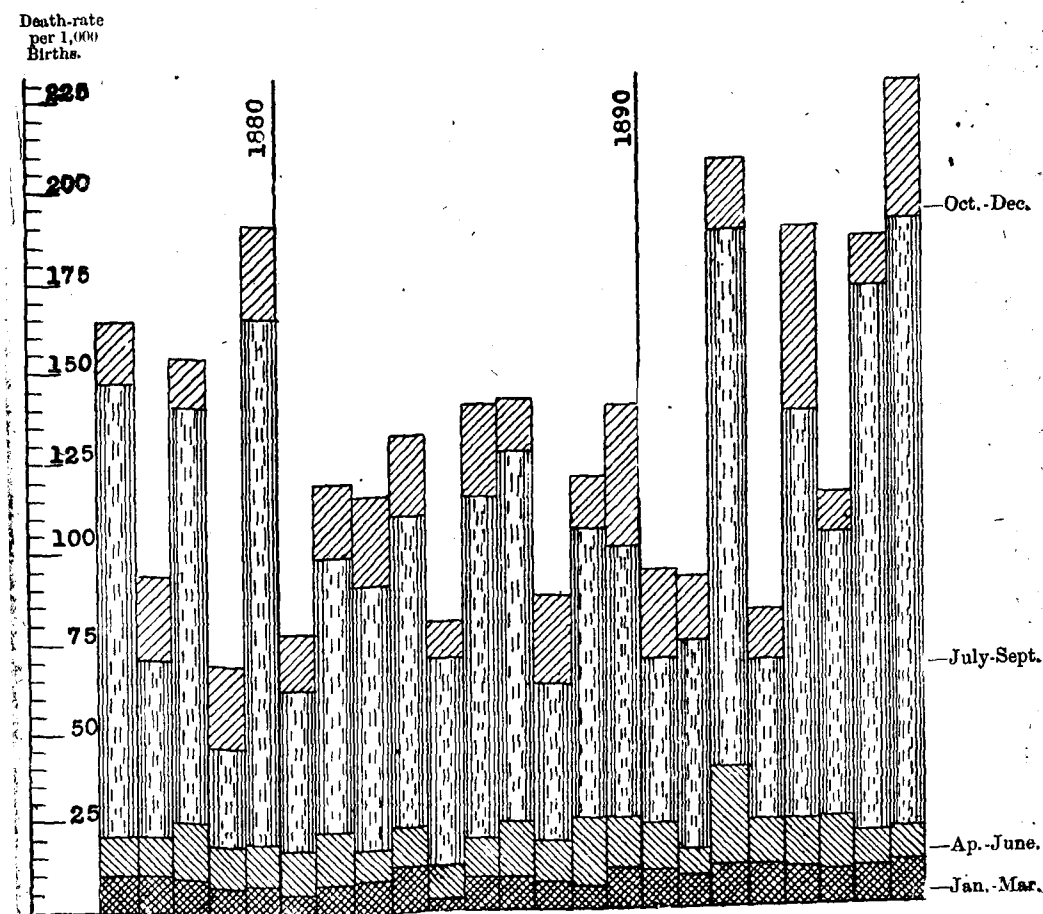


FIG. 19.—MANCHESTER (1876-98).

Population estimated 1876 = 357,917.
 " " 1898 = 539,079.

dry-middens, 743; water-closets, 35,807; and cesspools, 90.—*Dr. Niven, Annual Report, 1898.*

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 32.7, in the third quarter 88.0, per 1,000 births. The mortality was 10 per cent. of that in the highest (third) in the lowest (first) forms. For the first quarter it occupies the twenty-fourth, for the second the twenty-sixth, for the third the fifteenth, and for

the fourth quarter the twenty-fifth, place among the thirty-one towns in Table C. There is thus a large proportion of endemic diarrhoea in the city, the position of which is much better for the third than for other quarters of the year. The diagram indicates that Manchester has deteriorated in reference to diarrhoea, particularly diarrhoea of the epidemic type.

Nottingham.

Physiography.—Is situated on an acclivity of new red sandstone, rising from the river Trent.

Conservancy System.—In 1898 about 40,000 pails were in use, also a few privies, and probably 9,000 to 10,000 w.c.'s.

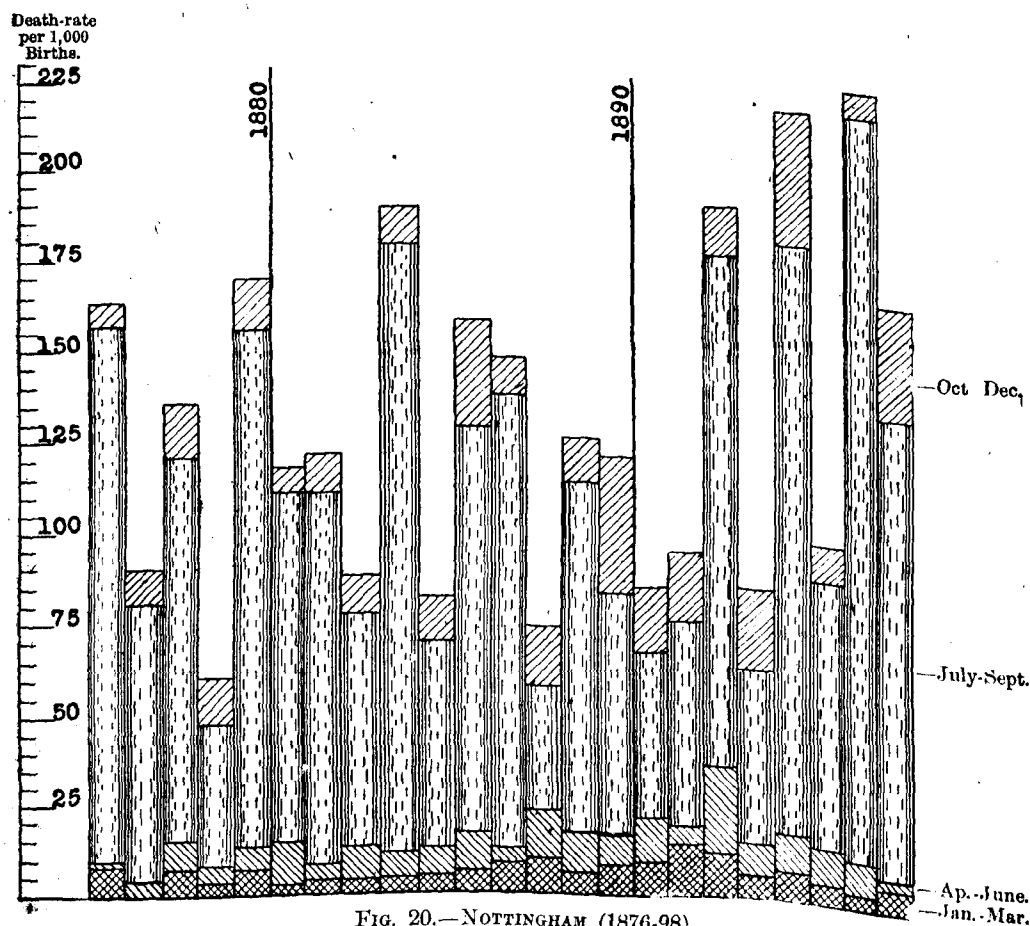


FIG. 20.—NOTTINGHAM (1876-98).

Population estimated 1876 = 93,627.

" " 1898 = 236,137.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 33.9, in the third quarter 102.0, per 1,000 births. The mortality

in the lowest (first) forms 7 per cent. of that in the highest (third) quarter of the year. For the first quarter of the year it occupies the twentieth, for the second the nineteenth, for the third the nineteenth, and for the fourth quarter the sixteenth, place among the thirty-one towns in Table C. There is an excess of diarrhoea both of the epidemic and inter-epidemic type. Nottingham is, as evidenced by the height of the peaks in the diagram, very susceptible to epidemic diarrhoea. In total diarrhoea it has slightly deteriorated in the course of the diagram.

Bradford.

Physiography.—Bradford is situated on the lower coal-measures or ganister beds, with sandstone (Elland flagstone) in places. The

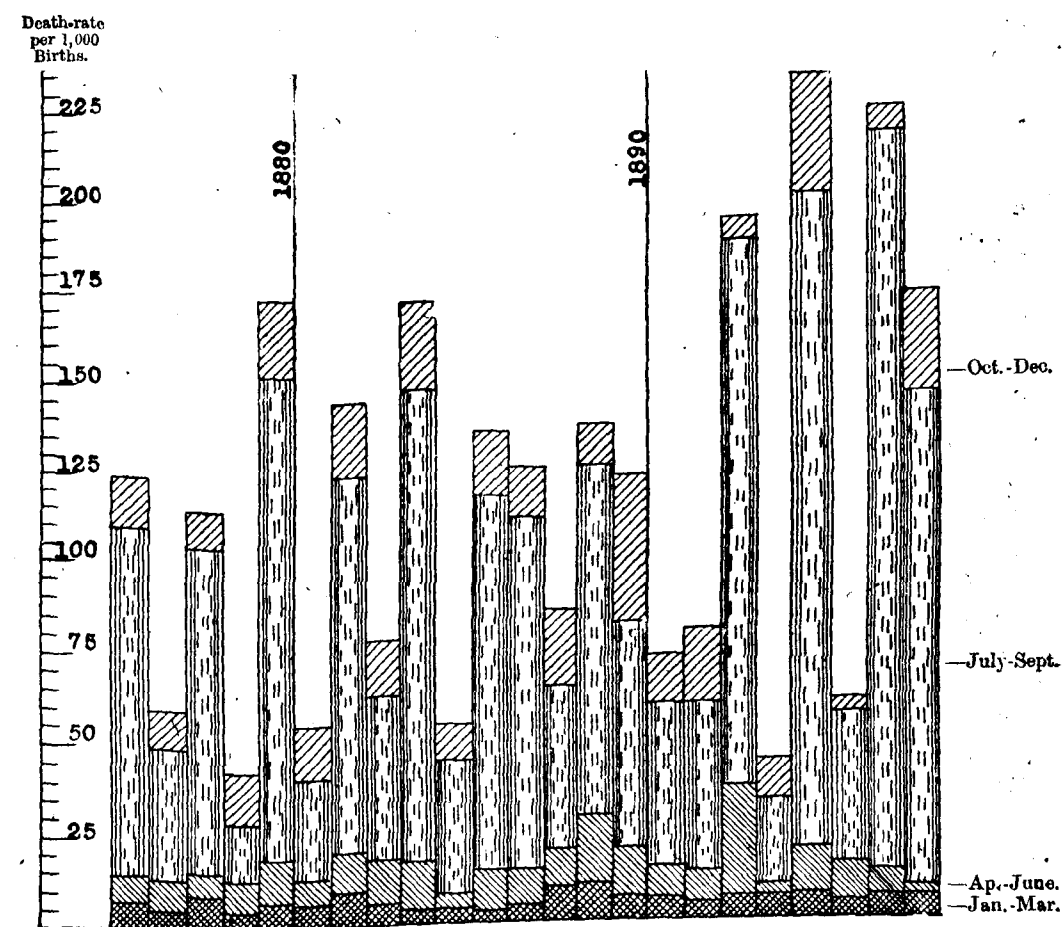


FIG. 21.—BRADFORD (1876-98).

Population estimated 1876 = 173,723.

" " 1898 = 233,737.

basin-shaped hollow, in the centre of which the town stands, is well-nigh covered by a thick deposit of boulder clay, containing numerous sub-angular stones. The clay is bluish, non-laminated, and very tough. The enclosed parts are derived from the grits and lime-stones of the northern part of the Aire Valley. In the district supplied by the Bradford waterworks the altitude ranges from 200 to 1,200 feet above sea-level, with a population of 365,000.

Conservancy System.—In 1894 there were 30,000 midden privies, 10,000 w.c.'s, and 500 waste-water closets.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 34.2, in the third quarter 98.9, per 1,000 births. The mortality in the lowest (first) forms 7 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the eighteenth, for the second the twenty-second, for the third the eighteenth, and for the fourth quarter the twenty-second, place among the towns in Table C. The diagram indicates a deterioration *re* diarrhoea. There are acute variations in its annual incidence, Bradford being evidently among the towns susceptible to the epidemic type of diarrhoea.

Leeds.

Physiography.—For the following description I am indebted to Dr. Spottiswoode Cameron: "Leeds is situated chiefly upon the ganister coal-fields, some portions of which are worked within the boundaries of the borough. The general tendency of the faults is to run from east to west. One important fault, a little to the north of the centre of the town, throws up the sandstone (Elland edge) that lies underneath the coal-beds. North of this another important fault runs from about north-east by east to about south-west by west. This throws up the millstone grit to the level of the Elland flags. Through the very centre of the town, from north-west to south-east, runs the river, and two important tributaries—the Hol Beck on the south, and the Meanwood Beck on the north—join the river within about half a mile of one another. They have contributed to make a somewhat considerable mass of alluvium along the course of the river and to the south of it. With this exception the subsoil is either sandstone, shale, or clay. The latter predominates throughout the town at the surface.

"The bed of the river has only a very gentle inclination, but the ground rises considerably to the north and to the south-west. Underneath, between the Elland flagstone and the Thornhill rock, although there are a few intrusions of sandstone, the layers are chiefly clay and shale. Such sandstones as lie between these rocks are somewhat of a raggy nature, and a good deal that is coloured

as sandstone in the geological map is really of this nature. The greater part of the most populous part of the town—the three divisions west, north, and south-east of the Leeds township—lie almost entirely on shale or clay. This clay or shale is covered by the alluvium already referred to in a portion of the centre of the town. I should regard the soil of Leeds as on the whole retentive of

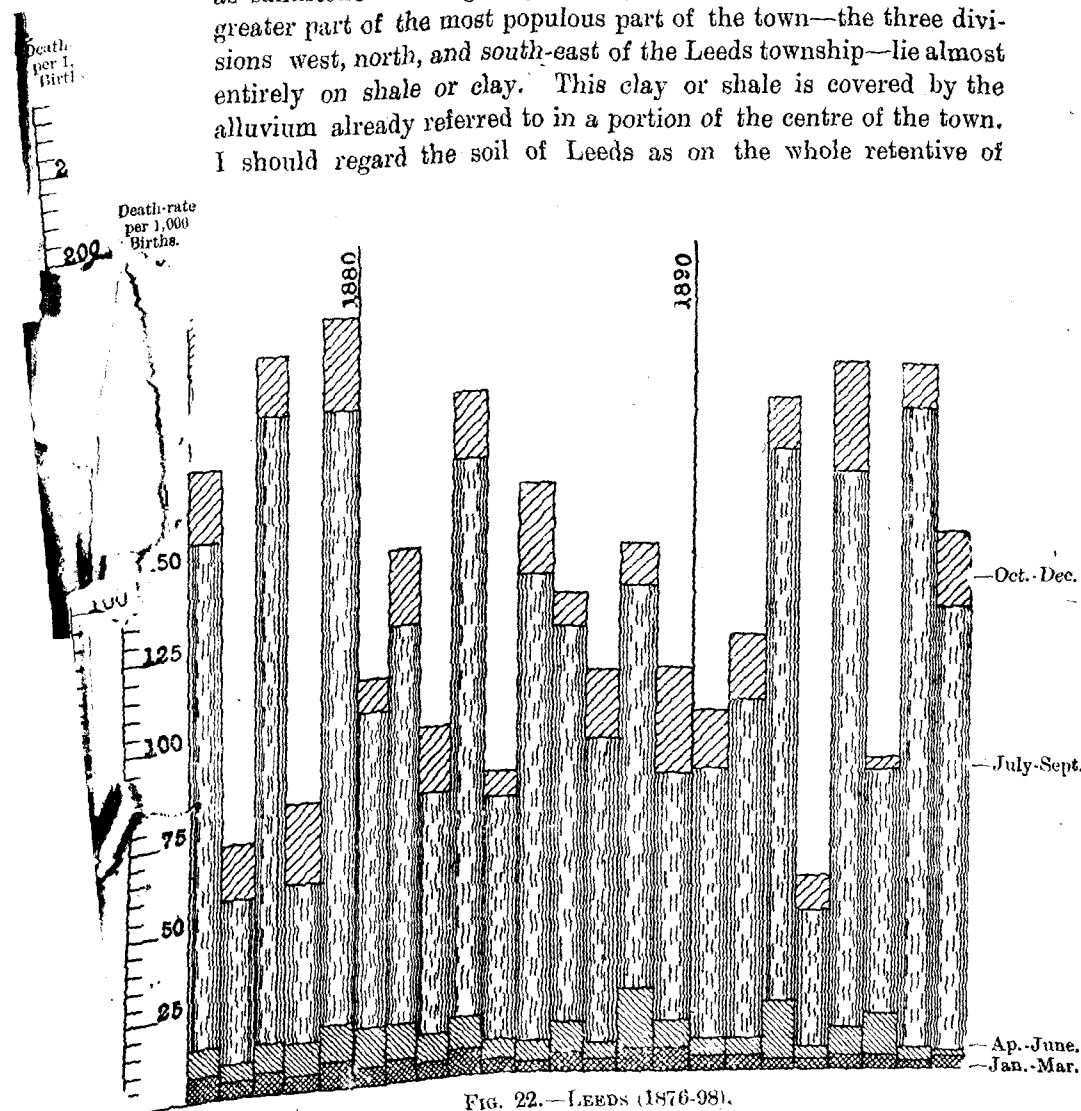


FIG. 22.—LEEDS (1876-98).

Population estimated 1876=291,580.
" " 1898=416,618.

moisture. Houses built on the sandstone are of course drier than those on the clay, but the alluvium itself holds a good deal of water. There are some very steep gradients as we ascend from the river-bed to the various rock strata, but the main sewer through the city has a very little fall indeed. The neighbourhoods of the rivers and the becks have suffered disproportionately to their population from

diarrhoea, but naturally they are not the districts inhabited by the cleanliest of the town people."

Conservancy System.—In 1898 the proportion of houses in the town with water-closets was 48.0, with trough water-closets 23.6, with middens 0.6, and with pails 0.7 per cent.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 34.3, in the third quarter 107.0, per 1,000 births. The mortality in the lowest (first) forms 4 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the seventh, for the second the sixteenth, for the third the twenty-third, and for the fourth quarter the fifteenth, place among the towns in Table C.

The diarrhoea is chiefly of the epidemic type. The town has remained fairly stationary as regards the prevalence of diarrhoea.

Liverpool.

Physiography.—Its outer part, where there are comparatively few houses, is on boulder clay. The greater part is on sandstone, varying greatly in porosity, the softer variety being quite, and the hard only partially, porous. Most of the city is on the softer variety. The residential part is on the pebble-beds of the new red sandstone, also very porous.

Conservancy System.—The w.c. system is now exclusively in use, all the old middens having been converted.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 34.8, in the third quarter 102, per 1,000 births. The mortality in the lowest (first) forms 7 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the eighteenth, for the second the twenty-fourth, for the third the twenty-first, and for the fourth quarter the nineteenth, place among the thirty-one towns in Table C.

The diagram shows no improvement in the incidence of fatal diarrhoea, even if allowance be made for recent hot and dry summers. There is deterioration, particularly in regard to epidemic diarrhoea.

Sheffield.

Physiography.—The middle and lower coal-measures and the millstone grit come to the surface in Sheffield. The populous area in the city is on the coal-measures, which consist of sandstones and shales in narrow beds. The shales near the surface are broken down, and form an almost perfect clay. In many parts the sandstones are also covered with a more or less impervious clay. Sand-

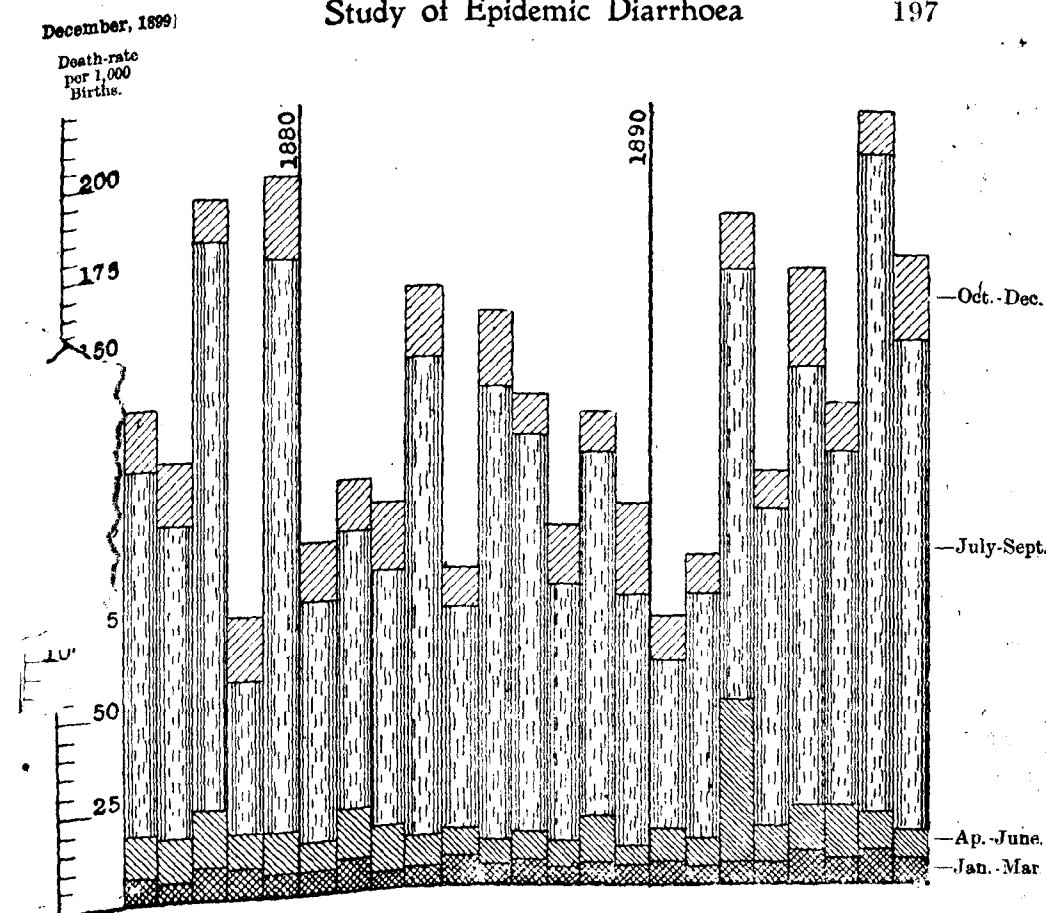


FIG. 23.—LIVERPOOL (1876-98).

Population estimated 1876=521,544.
" " 1898=633,645.

stone only comes to the surface in small areas. Thus the surface is almost entirely impervious. The gradients in the city are decidedly steep.—Letter from Dr. Robertson, M.O.H.

Conservancy System.—About 20,000 middens, 5,000 to 6,000 w.c.'s. A gradual conversion of middens to w.c.'s is in progress.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 35.6, in the third quarter 116, per 1,000 births. The mortality in the lowest forms only 4 per cent. of that in the highest quarter of the year. For the first quarter it occupies the tenth, for the second the eighth, for the third the twenty-eighth, and for the fourth quarter the tenth, position among the thirty-one towns in Table C. Thus it has, as will be seen better in the diagram (page 198), but little pre-epidemic and post-epidemic diarrhoea. The chart shows no improvement in recent years, but some deterioration.

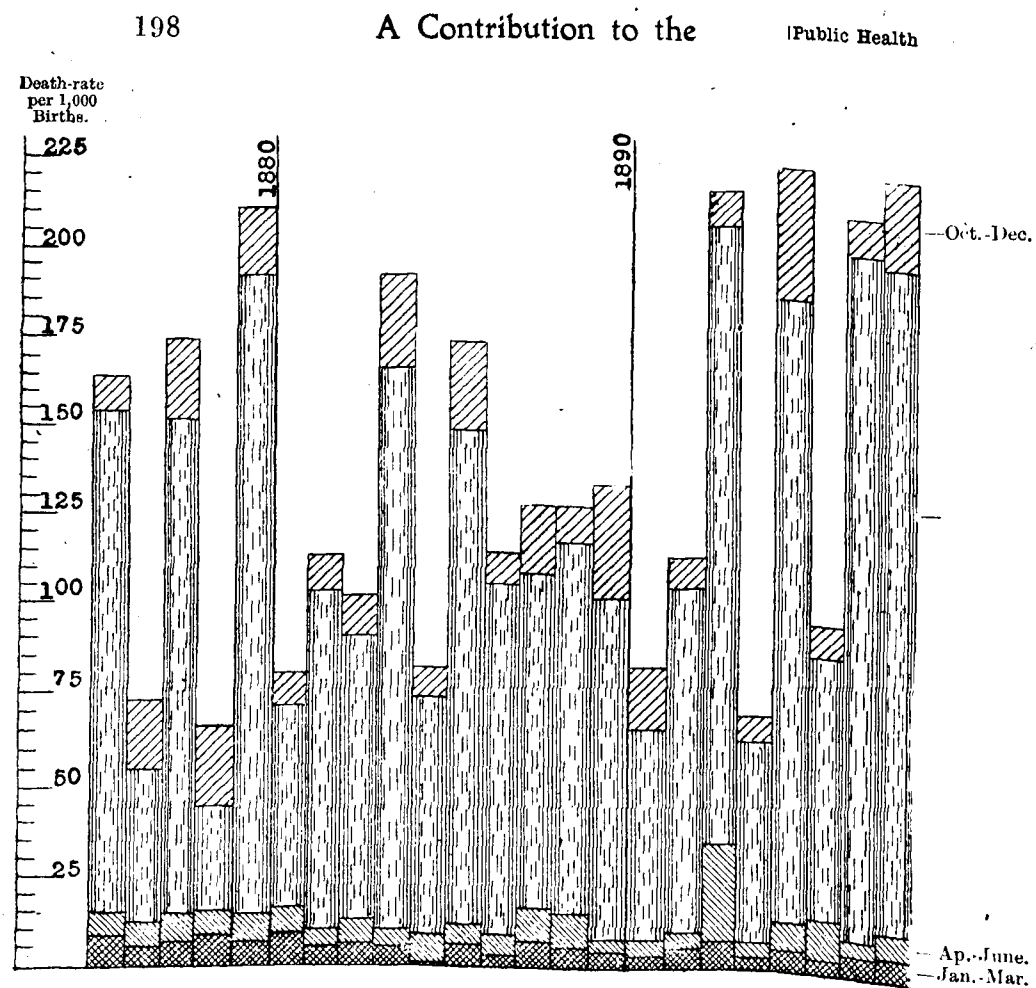


FIG. 24.—SHEFFIELD (1876-98).
Population estimated 1876=274,914.
" " 1898=356,478.

Wolverhampton.

Consewancy System.—Not many privies; about 14,000 pail-closets and 3,000 water or slop-water closets.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 37.4, in the third quarter 112, per 1,000 births. The mortality in the lowest (first) forms 7 per cent. of that in the quarter (third) of greatest mortality from diarrhoea. For the first quarter it occupies the twentieth, for the second the fourteenth, for the third the twenty-fourth, and for the fourth quarter the twenty-sixth, place among the thirty-one towns in Table C.

The diagram indicates a considerable deterioration in the condition of Wolverhampton in respect of diarrhoea.

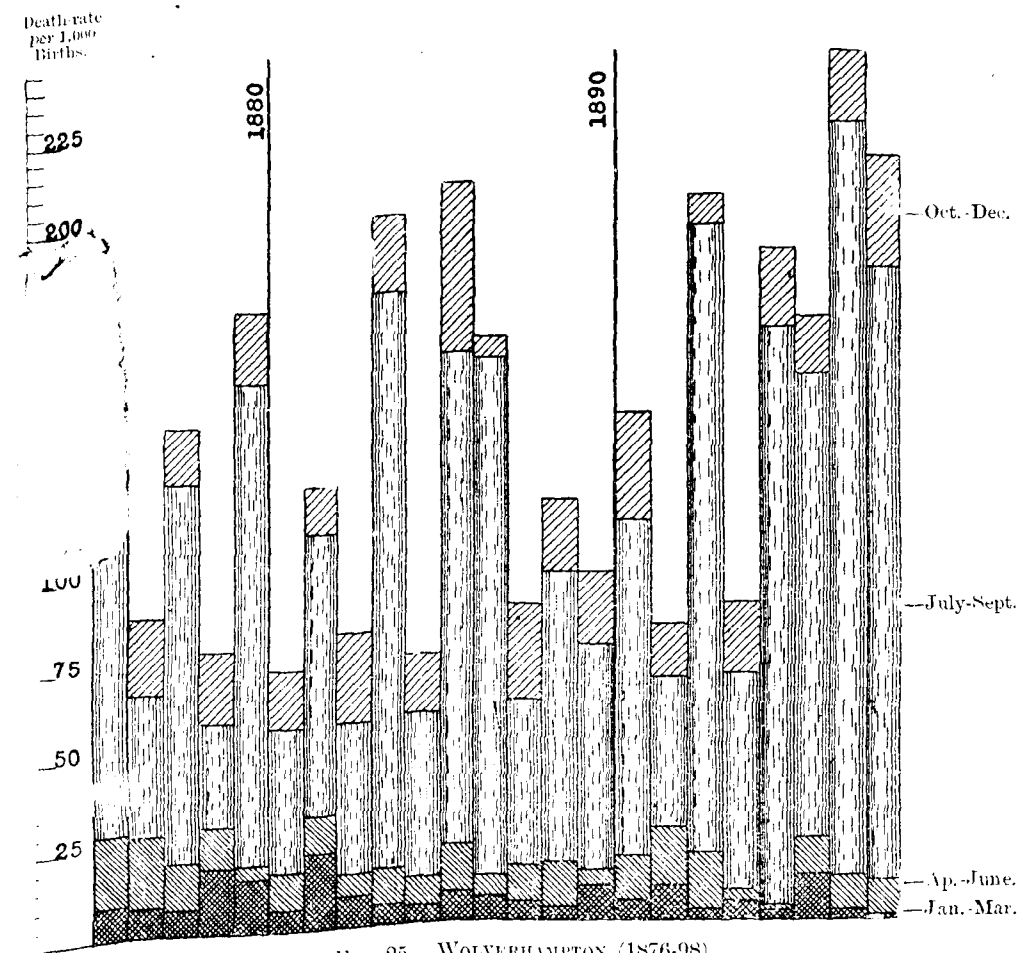


FIG. 25.—WOLVERHAMPTON (1876-98).

Population estimated 1876=72,549.
" " 1898=88,051.

Hull.

Physiography.—Is a seaport town, standing on a level plain so low as to render embankment necessary to protect it from inundation. The soil is entirely Humber alluvium, consisting of fine sandy clay, used extensively in making bricks. This deposit is 4 to 10 feet thick, resting on layers of silt, sand, or gravel, the whole of which is incumbent on the chalk formation, which varies from 40 feet to 110 feet from the surface. The area of the borough is flat, and natural drainage would be impossible were it not for the ebb and flow of the tide in the rivers Hull and Humber, by which

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A Contribution to the

[Public Health

a fall of 10 feet to 15 feet is obtained for several hours daily.—
Dr. Mason, M.O.H.

Conservancy System.—About 47,000 middens (mostly small cemented receptacles), and 3,000 to 4,000 w.c.'s.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 37.9, in the third quarter 118, per 1,000 births. The mortality in the lowest (first) forms 5 per cent. of that in the highest (third)

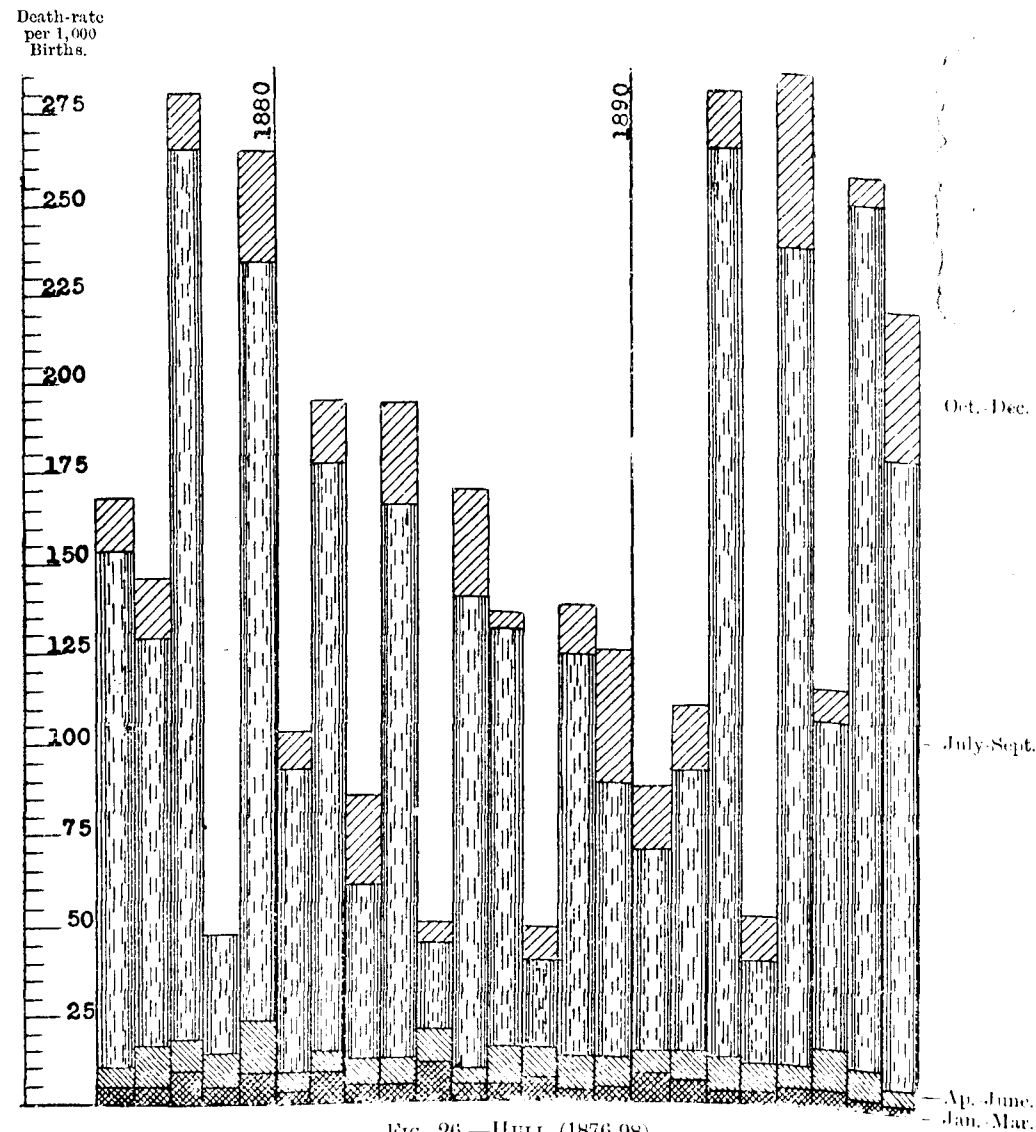


FIG. 26.—HULL (1876-98).

Population estimated 1876 136,933.
" " 1898 229,887.

quarter of the year. For the first quarter it occupies the thirteenth, for the second the tenth, for the third the twenty-ninth, and for the fourth quarter the twenty-fourth, place among the towns in Table C.

The chart shows but little diarrhoea in the first and second quarters of the year. Hull must be included among the places exceptionally sensitive to the causes producing epidemic diarrhoea. There is no evidence of improvement in recent years.

It is interesting to note the smaller amount of diarrhoea (shown also in other towns) in 1881-90 along with climatic conditions on the whole unfavourable to diarrhoea. The excess in recent years is as great as that shown in years before 1881.

Birmingham.

Physiography.—In Dr. A. Hill's annual report for 1893 it is stated that the highest part of Birmingham is 679 feet, and its lowest 261 feet, above sea-level. It is built for the most part on sand or gravel. Thus its soil is porous, and the surface undulating.

Conservancy System.—About 11,000 middens, 33,000 pail-closets, and 38,000 w.c.'s and slop or waste-water closets.

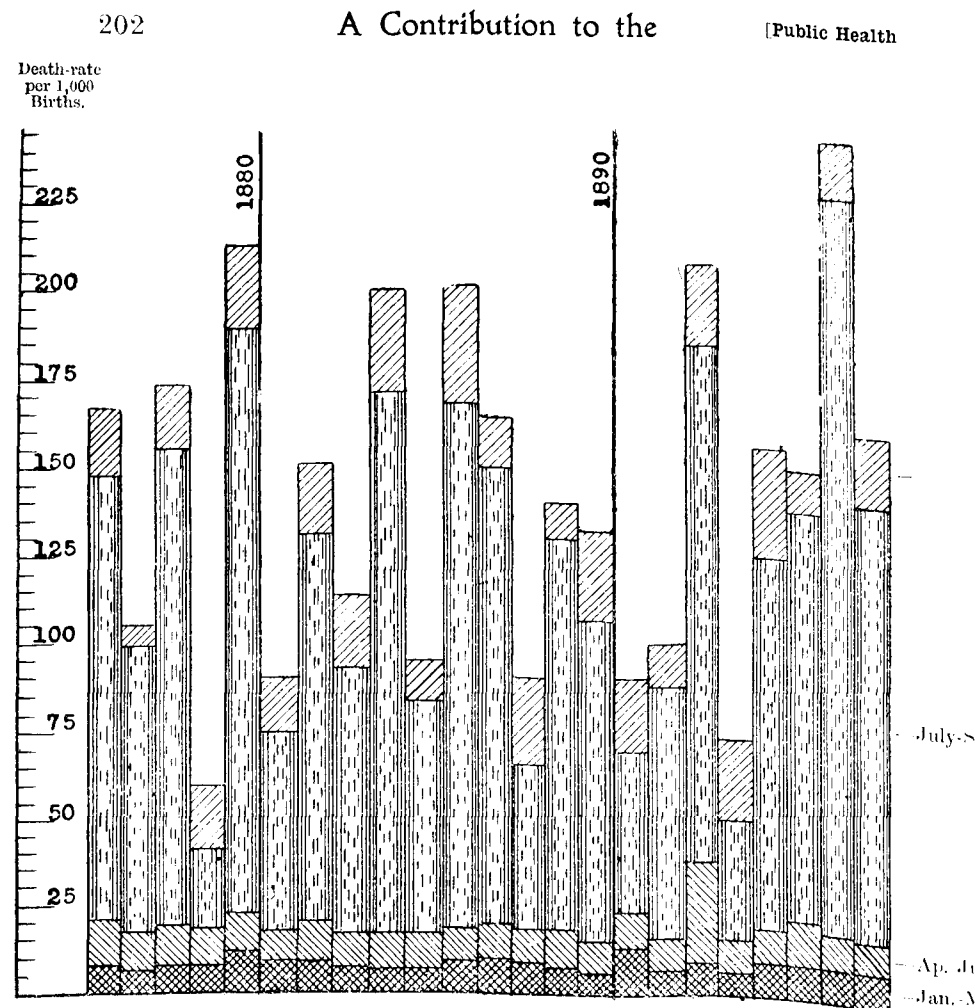
Course of Diarrhoea.—The average annual death-rate, 1882-98, was 38.0, in the third quarter 113, per 1,000 births. The mortality in the lowest (first) forms 7 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the twenty-third, for the second the twenty-first, for the third the twenty-sixth, and for the fourth quarter the twenty-third, place among the towns in Table C. The chart (page 202) indicates a fairly stationary condition, neither improvement nor deterioration having occurred to any marked extent. There is excess in pre- and post- epidemic as well as in epidemic diarrhoea.

Salford.

Physiography.—It stands on a level plain, the gradients being slight in nearly all parts. The underlying strata are coal-measures and new red sandstone. The surface drift is of clay and sand. Not more than one-tenth of the houses are on sand, the rest on clay. The clay is in some instances of considerable depth, the bed having been worked to the depth of 50 feet for brick-making. The sand mainly lies over the coal-measures, but sometimes the clay overlies this. There are also pervious pebble-beds throughout the district.

—Dr. Tattersall.

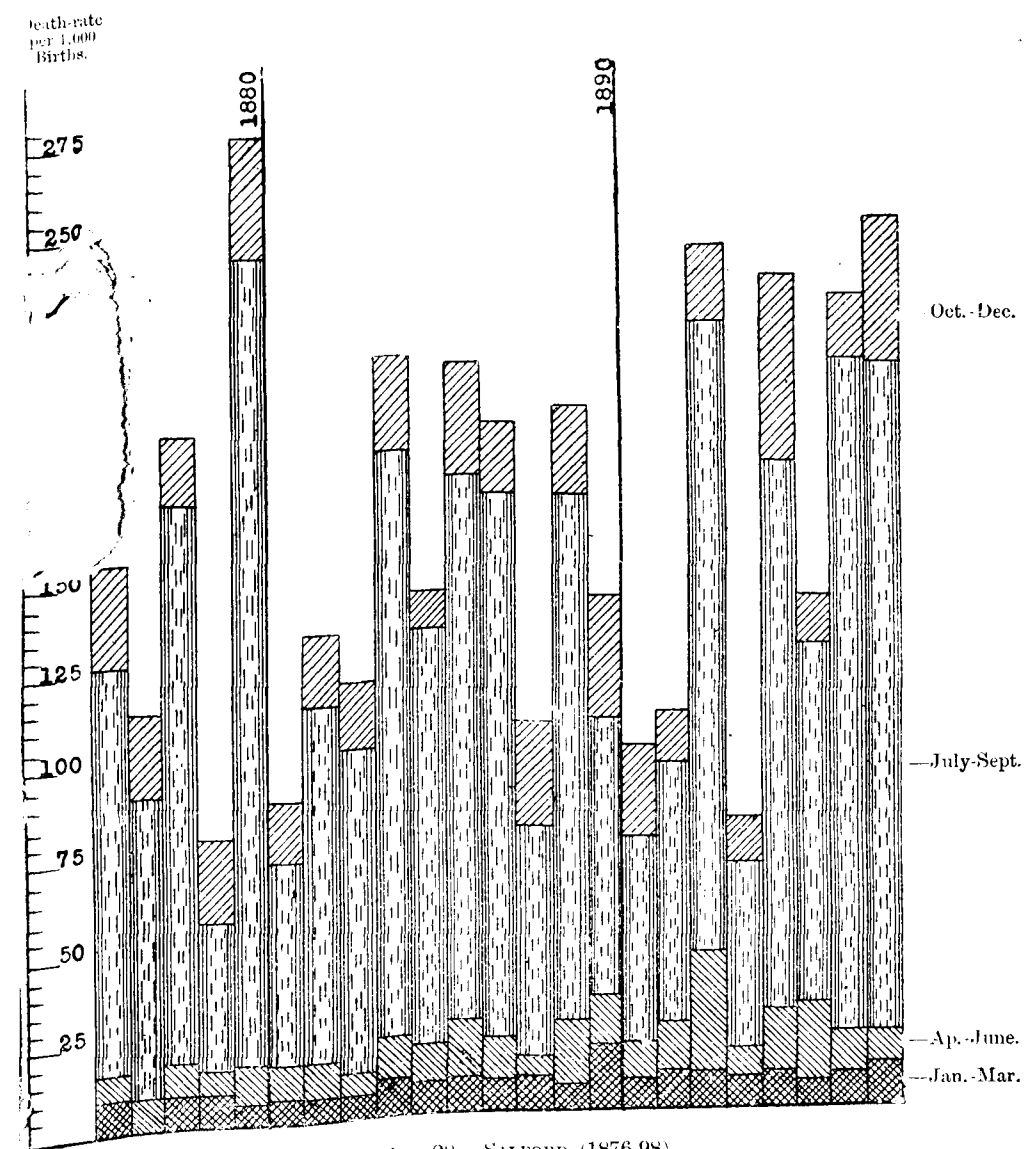
Conservancy System.—About 13,000 middens, 8,000 pail-closets,



and 5,000 w.c.'s. (Numbers not accurate, but may be taken as an approximate proportion between the three systems.)

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 40·7, in the third quarter 114, per 1,000 births. The mortality in the lowest (first) forms 8 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the twenty-fifth, for the second the twenty-ninth, for the third the twenty-seventh, and for the fourth quarter the twenty-seventh place, among the thirty-one towns in Table C.

Salford is the fifth worst of the great towns, and the diagram indicates some deterioration in recent years. Manchester is fourteenth from the bottom of the list in Table C; but it is open to



townise that its favourable position is partially caused by the "rating-down" of statistics associated with the inclusion of outlying districts in the city. Salford has, however, always been worse than Manchester *re* diarrhoea. The density of population in the two cities is practically identical. Salford has a bad record in all four quarters of the year.

Blackburn.

Physiography.—It is situated principally in the valley of the Blackwater, and to a much less extent in that of the Darwen, the two rivers joining on the western boundary of the borough. To the north of the Blackwater the land rises, after a few hundred yards, rapidly

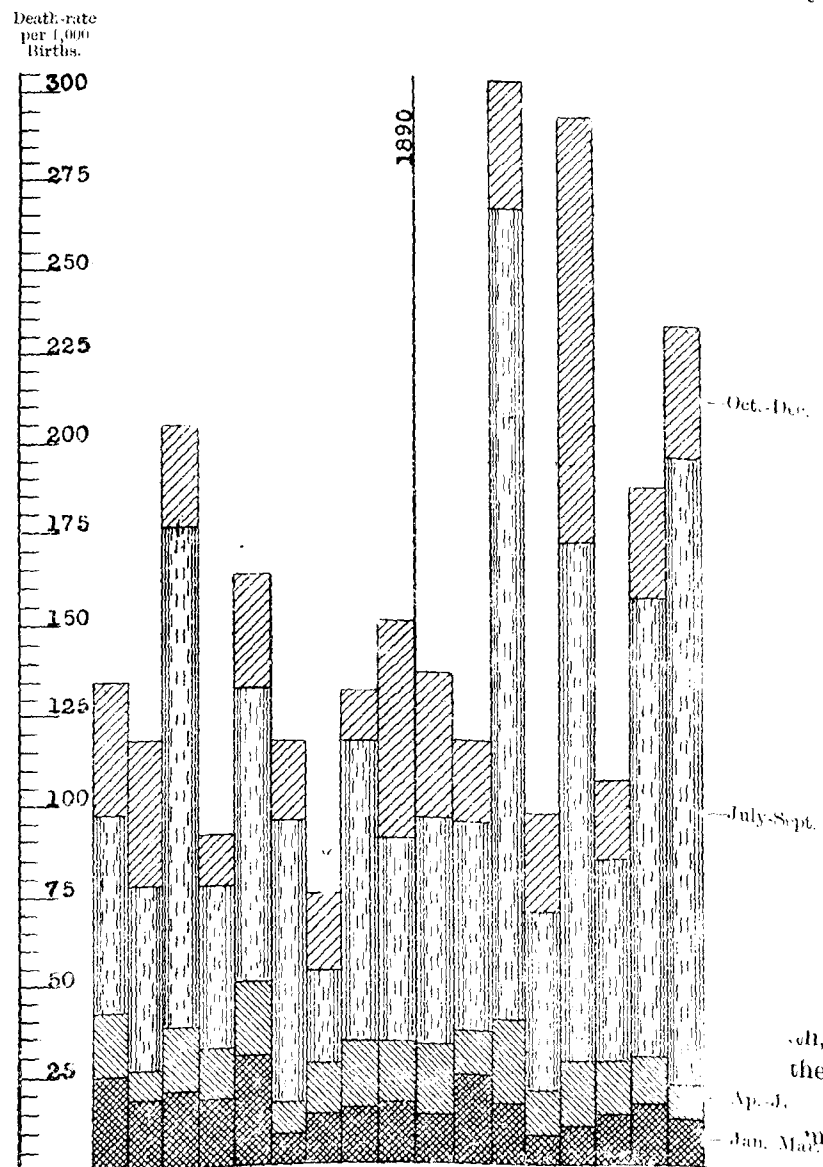


FIG. 29.—BLACKBURN (1882-98).

Population estimated 1882—106,460.
 „ „ 1898—133,228.

from 300 to 700 feet high. To the south and west of the Darwen it also rises fairly rapidly from 300 to 600 feet. The land between the two rivers at first has no great inclination, but towards the south-east it rises rapidly to a height of 650 feet. On the north side of the town the gradients are as high in one or two instances as 1 in 7, and 1 in 10 or 12 are not uncommon. On the southern side the steepest slope is 1 in 10. The fall of the valley of the Blackwater is 1 in 138.

The deep strata underlying the town are principally the lower coal-measures, with a narrow strip of alluvium in the valley of the Darwen. Millstone grit (rock and shale) comes to the surface over a considerable area of the northern side of the borough, and to a very small extent on its southern side. The coal-measures are covered with drift beds of clay and sand, and the millstone grit is partly covered. The portion of the borough on millstone grit is principally agricultural land, at least 90 per cent. of the town being on the coal-measures.

The drift beds are principally clay, although there is a considerable area in the centre of the town with a good depth of fine sand. Probably about one-sixth of the town is built upon sand, and five-sixths upon impervious clay or a mixture of clay and gravel. A few houses are built on rock. (The above description is taken almost verbatim from a letter from Dr. Wheatley to the writer.)

Conservancy System.—About 35,000 middens, 10,000 pails, and 10,000 water-closets. Gradual replacement of middens by w.c.'s proceeding.

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 41.3, in the third quarter 89.3, per 1,000 births. The mortality in the lowest (first) forms 18 per cent. of that in the highest (third) quarter of the year. In the first quarter it occupies the thirty-first, in the second the thirtieth, in the third the sixteenth, and in the fourth quarter the thirtieth, place among the towns in Table C.

Although the chief incidence of diarrhoea is in the third quarter, it has also an exceptionally large amount in the other quarters of the year, especially the fourth. In this respect it resembles the Scotch towns, but is much worse than the latter, and than any other town in the first and second quarters, and than any other town, except Preston, in the fourth quarter. The town is deteriorating as regards both endemic and epidemic diarrhoea.

Bolton.

Physiography.—Is eleven miles north-west of Manchester. It lies in the undulating plains of the coal-measures, in the central part of

the Lancashire coal-field, with its south and north boundaries of new red sandstone and millstone grit. The district is deeply overspread with boulder clay and sand. The valley in which Bolton lies is surrounded by hills on three sides, being open to the south, where

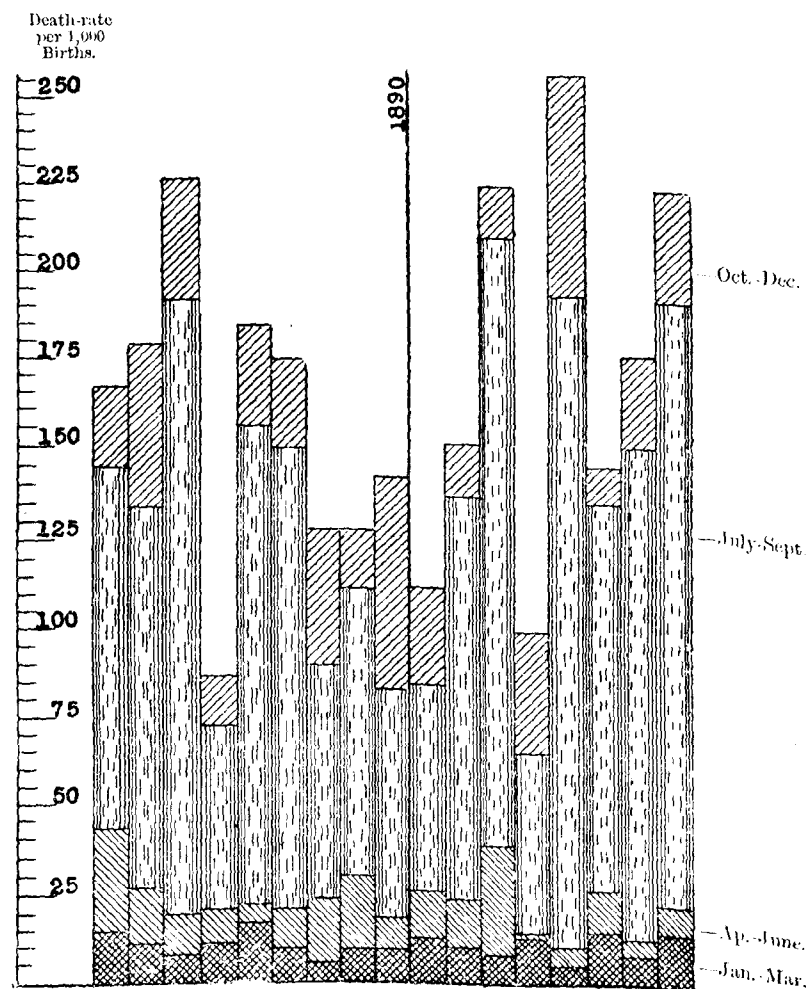


FIG. 30.—BOLTON (1882-98).

Population estimated 1882 = 106,767.
 " " 1898 = 122,495.

it slopes gradually towards Manchester. Its elevation varies from 230 to 500 feet above sea-level.—*Report of M.O.H.*, 1896.

Conservancy System.—A gradual conversion to the w.c. system is going on; but there are still in the old borough 12,740 privy-ashpit

closets, and 6,782 pail-closets as well as 4,702 waste-water closets, and 2,295 fresh-water closets.—*Annual Report, Dr. Gould*, 1898.

Course of Diarrhoea.—The average annual death-rate, 1892-98, was 42.0, in the third quarter 112, per 1,000 births. The mortality in the lowest (first) forms 9 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the twenty-seventh, for the second the twenty-eighth, for the third the twenty-fourth, and for the fourth the twenty-ninth, place among the thirty-one towns in Table C.

There is, up to the end of 1898, no improvement, the town appearing to be gradually deteriorating in respect of diarrhoea. Note the excess in the fourth quarter, and the fact that diarrhoea is constantly present in larger amount than in most English towns.

Leicester.

Physiography.—Is a midland town, situated in a gentle hollow on the river Soar. Speaking generally, it is upon clay, beneath which lies the new red sandstone; but following the bed of the river for a variable distance on either side, alluvial deposit is found consisting of sand, gravel, etc., of a varying thickness. The greater part of the population is housed on the marshy alluvium, the remainder on boulder clay and on marl and other impervious beds. The subsoil of the borough has been for a long time in a polluted state, and in many localities, according to the late Dr. Tomkins (from whose report for 1887 most of the above information is derived), it is actually sewage-sodden. The direction of the valley is such that the prevailing winds do not sweep along it, but rather across it. Dr. W. E. Buck* describes Leicester as "virtually in a hole with a canalized river dammed up against it by mills and locks." There is on the north-east of the town a brook, which is held up by the river, and which is known to affect wells to a considerable distance.

Conservancy System.—In 1896 about 20,000 w.c.'s, 7,000 pails, and 2,000 middens (probably a larger proportion of w.c.'s in 1898).

Course of Diarrhoea.—The average annual death-rate, 1882-98, was 48.7, in the third quarter 163.6, per 1,000 births. The mortality in the lowest (first) forms only 2 per cent. of that in the highest (third) quarter of the year. For the first quarter it occupies the second, for the second the twenty-fifth, for the third the thirtieth, and for the fourth quarter the eighth, place among the thirty-one towns on page 147.

The diagram for Leicester shows a marked contrast to those for Preston and Bolton in the fact that there is very little early pre-

* *Trans. San. Inst.*, vol. vii., 1885.

hand, you are aware that the class-place of Koch's bacillus moves yearly further and further from the schizo-mycetes and approaches more and more closely to the hypho-mycetes. It is scarcely necessary to remind you of the difficulty met with in attempting to cultivate this microbe—that it grows in the laboratory only on specially selected media, and that it strongly prefers special temperatures; but it should be pointed out that these difficulties vastly enhance the value of experiments which seem to show that it can grow with comparative ease apart from special media, and indifferent to high temperature, provided only it be furnished with the foul organic vapour of human breath, or with the foul vapour of damp subsoils. Such vapours commonly pervade much of the poor house property in every city: and in view of common laboratory experience Ransome's experiments furnish just the evidence necessary to explain the persistence with which infection is observed to cling to houses uncleansed after removal of the consumptives who first communicated it to them. So that, just as the necessity of attending to the state of the dwelling as regards light and air appeared before, so now it appears that the effort at prevention must not stop at such improvement of that sort as those can alone make who are obliged to live in houses requiring it. Nor would that measure of improvement suffice, though combined with all the care to destroy infective sputa which is practically attainable. More must be done. Drainage of damp subsoils, the sewer-ing of unsewered neighbourhoods, the scavenging of filthy yards and lanes, and isolation of the interior of houses from the ground air must be secured. Nay, more still, the interior of houses must be kept clean in the sense in which notable housewives interpret that term.

Thus was the ætiology of consumption slowly worked out, and thus, *pari passu* with the stages which marked discovery of the various factors in the complicated problem of its maintenance and diffusion, did we come into possession of the methods of prevention. Our teaching of to-day is based on no happy discovery suddenly made, nor even on the genius of any single searcher. It is the result of a long-drawn series of practical demonstrations of the agency of diverse but correlated conditions. And consequently it advocates no nostrum. It inculcates the importance of conserving and destroying phthisical expectorations, but not that this alone is sufficient. The preventive scheme must have as many branches as there are diverse contributory causes, and its application requires proportionate knowledge, intelligence, persistence, and, be it added, sacrifice.

III.—The more important facts in the ætiology of consumption may be briefly stated as follows. The cause of infection is specific and single; those who suffer from the disease are the source of infection to others; those who are suffering from consumption of the lungs alone give off the infection in quantity, and in ways, which have great importance to others; they give it off almost entirely in their expectorations. Secondly, the infection can maintain its virulence for a long time outside the body from which it has been thrown off; it gains access to others by the air, on which it is borne to them. It follows, consequently, that the common mode of infection is not direct from person to person, but indirect; that localities can be infected by the sick, and can retain their infectivity in absence of the person who has infected them. Thirdly, the infection is easily destroyed by sunlight and fresh air after it has been thrown off, and consequently special conditions are necessary to its long-continued virulence outside the body; special conditions of the uninfected body are also necessary to successful invasion of it; these two sets of conditions may be regarded as practically one and the same, for in the lack of fresh air and light, and in the dampness and the dirtiness which are the conditions necessary to long-continued virulence of the infection, the healthy body deteriorates, loses its powers of natural resistance, and becomes a prepared victim of the virus.

These being the ascertained ætiological facts, they are also those on which preventive measures must be based. They indicate that cognisance must be taken of consumptives themselves, of the locality in which they contracted their disease, of the houses they occupy or have occupied, of their relations to others living in the same dwelling, and of the constitutional state of these latter with reference to the probability of their having or of their retaining a full measure of natural resistance. On consideration it will be perceived that these points mark the whole area covered by social life, or at all events all covered by town life; and phthisis is distinctively a disease of cities. It is in cities, as Professor Verneuil has usefully pointed out, that phthisis is more common, takes graver forms, progresses more rapidly, heals or even improves more slowly and in a smaller proportion of cases, and that slight attacks continue longer, and more frequently tend to become grave; while, on the other hand, in country life remissions are often observed, and a chronic course which is almost equivalent to recovery is common. The inference is, as we have already seen, that the general conditions of life in cities are the cause of the great prevalence of phthisis, and not mere propinquity of the sick to the healthy; and

it follows as a corollary that the share which a Government can take in extirpating tuberculosis from any city it does not own must be limited. It can but legislate on broad lines, and leave the detail to be filled in by the people themselves. It is conceivable that some Government might deal with all consumptives as we here deal with lepers (who, by the way, at the very worst reckoning, are far less dangerous than consumptives), and with all house property in a manner which is certainly desirable on a dozen counts connected with public health, but which owners would probably regard as destructive of all their rights. The death-rate from phthisis, as far as we can see at present, would by those means be reduced very rapidly, and its reversion to the proportions it has at present would be prevented. This would be the direct course, but we know that the first of these speculative measures is impossible, and that the second is only not impossible. Nevertheless, though that which the State can do is necessarily limited, it is essential. Let us first consider what it must do, it will then be easier to discern whether anything remains in which some private association could usefully engage.

In the first place, there can be no doubt that phthisis should be made a notifiable disease (as has been done already in South Australia). No other form of tuberculosis should be notifiable, and the register should be declared strictly confidential as regards names. Next, the State should provide for the free bacteriological examination of sputa; and this also should be a strictly confidential transaction between medical men and the central health authority. Thirdly, it should make the disinfection of rooms from which consumptives have been removed, or in which they have died, before they are reoccupied by any person, obligatory on owners and occupiers of houses, and should require such disinfection to be done to the satisfaction of a legally-qualified practitioner of medicine, who should be required to certify to it in writing. Fourthly, district registrars should be required to notify every death from phthisis as soon as registered by them. Fifthly, good building laws should be enacted, and steadily enforced. Much beyond that I do not think the State should go, at all events at first; but the central health authority should forward by post some brief pamphlet of instructions to the persons whose names are notified to it. That, I dare say, seems to some little enough for a Government to do. But it contains what is essential. It furnishes the means of learning what the number of sufferers is, and the facts as to incidence of the disease on classes, occupations, and localities; and this knowledge is the indispensable foundation of practical

measures of prevention. In order to remove the all-important secondary causes of consumption most expeditiously and most economically the faulty spots must be identified, and occurrence of cases of the disease furnishes the best index to them. Try to imagine, for a moment, a police charged to control unruly characters, but entirely ignorant of their appearance, habits, haunts, and journeyings. It is scarcely possible to do so. Yet that is the position of most States in relation to living consumptives among the population. The information furnished by a well-ordered scheme of notification after being carefully compiled, abstracted, and charted, would in a few years furnish the requisite guide to effective action, and by being communicated to the public would gradually render effective action more completely possible.

At this point it seems necessary to interpose a few words on the notification of phthisis, at which many medical men, and among them several whose opinions command respect, look askance. The objections suggested are diverse, and I venture to discriminate them into two distinct classes. One comprises objections to notification itself, or rather presumed difficulties in the way of it; the other comprises objections which in reality have nothing at all to do with notification, but which relate to the uses it is apprehended might be made of the information furnished by it. For purposes of discussion and agreement that seems to be a distinction of some importance. In the former class are comprised difficulty of diagnosis, and inevitably reduplicated notifications of the same case. As to difficulty of diagnosis, a small proportion of notifications would doubtless be made in error. But it would surely be impractical to renounce the benefits which notification can certainly yield, because a few cases prematurely thought to be in the earliest stage of disease would be wrongly returned, and because a few others undiagnosible with certainty during life would not be returned. After all, in the vast majority of cases, phthisis is recognised—even apart from bacterioscopy of the expectorations—with greater certainty than most other common diseases. As for repeated notifications of the same case, this would be certain to occur rather often with a disease which follows a prolonged course for the most part, and in which sufferers commonly appeal to several different medical men for help. But this is merely a matter of money, and probably of a comparatively small sum, for the really important danger which attaches to it—that of falsification of the register, and, consequently, of the practical indications drawn from it—can very easily be guarded against. It cannot be supposed that the Government of any State would be deterred by the incidental risk of spending a

thousand pounds a year unnecessarily from endeavouring to prevent a disease which cost it a thousand lives a year. The second class of apprehended difficulties fades away as soon as the uses to be made by the State of notification have been defined as they have been defined already above. The whole proceeding should be confidential. States have little to do with individuals. In this matter they could not act successfully except on the general principles by which States are usually guided in legislating. Lastly, on this topic it must be said that to profess to wish that phthisis were prevented—to admit its communicability from the sick, to admit that consumptives are the main cause of its maintenance and diffusion, to admit the facts of local incidence and of house infection (all of which things, I suppose, we all do admit)—and then to oppose notification on any ground short of demonstrated impossibility, seems to be sheer capriciousness or sentimentality.

Suppose the State to have taken the action just described, does anything remain which might be done at once, and which is peculiarly within the province of a private association? I think there are two main things, and there are some which are subsidiary. The two things are these, and, though they may perhaps seem identical, it is very important indeed that they should be kept distinct: (a) provision of hospital accommodation, and (b) prescription of the terms of admission thereto. I spoke at first rather slightly of hospitals for the treatment of consumption, and it is the case that in relation to prevention institutions primarily designed for the treatment of infectious diseases deserve little consideration. The two functions are not mutually exclusive, of course, far from it. The difference between an isolation hospital and a general hospital really lies in the qualification for admission. An association for the prevention of phthisis must provide itself with a hospital, but it must be primarily a segregation hospital. The qualification for admission to it must therefore be, not alone the fact of suffering from phthisis, but the ascertained fact of living while so suffering under conditions which necessarily involve danger of infection to others. This point will be recognised as vital to preventive schemes as soon as it is mentioned, and therefore no more need be said about it.

I pass on to mention the subsidiary matters which may well engage the attention of such an association, as being of a kind which cannot well be transacted by officials of the State—executing a law, and I do so without staying to consider whether the State might not properly be expected to furnish the segregation hospital. Perhaps it might; but though it may probably contribute towards the cost it seems to be recognised that it is very little likely at pre-

sent to provide one. The subsidiary matters are these. In order to decide which cases among all those which present themselves, or which are presented, for admission to hospital, properly fall under the rule mentioned above, the association must visit many of the sufferers in their houses. We are here on delicate ground, but a discreet director, and discreet visitors, can doubtless be found. In many cases the visitor's report would require amplification or support by a statement of the case made by a medical man; and for this, it is not altogether unnecessary to add, a fair fee should be paid from the association's funds. Another matter is the dissemination of information. It is very well to distribute leaflets and the like; in some connections I have employed them very freely in New South Wales. But simple as such documents usually are, and entirely free from difficulty to the highly educated, there are very many people, and not alone among the uneducated, who are unable to put written advice to practical use without some verbal explanation and some slight demonstration. With the task of providing explanations, advice, and encouragement, would naturally be combined that of furnishing spittoons for indoor and for outdoor use to those who were unable, or who seemed unlikely to buy them for themselves. There is yet one more thing that discreet visitors could do, which eventually would be of high service. They should be possessed of sufficient knowledge of healthy house construction to record the character of all houses in which they found consumptives living; or, if they have it not, the association should provide means for instructing them in it. This, together with some record of the ravages often produced by the disease in families, would, if carefully compiled and published, do much towards that education of public opinion on which sound progress in a matter which in many relations of detail is both delicate and somewhat difficult, can alone be made. I do not lay great stress on these subsidiary matters. I have no doubt that the main object of such an association should be to endeavour to secure hospital accommodation for all those whose continued presence at home necessarily involves danger to the rest of the household, and to take care that no others are admitted until all of them have been provided for. Observance of this rule would leave full scope for the treatment and management of those who were admitted; but it will be agreed, probably, that the treatment of consumption, though a charitable and in a measure a useful work, should not be a prime motive with an association for the prevention of consumption. Lastly, every such association should take especial pains to avoid being mistaken for a charitable organization; that imputation would be fatal to its efficiency.

It is not usual to frame an address to be delivered on such occasions as the present on a single subject. Nor have I done so, for the prevention of phthisis can be accomplished only by approaching perfection in the "art of living in towns." Once more, I repeat, viewed from the standpoint of practical hygiene, the causes of consumption are seen to be many; the disease is maintained and diffused by indirect and not by direct communication between the sick and the healthy; the conditions necessary to indirect communication lie in our surroundings, and if all those surrounding conditions which are requisite to the maintenance and diffusion of phthisis were removed, the general death-rate from all causes out of the natural course would be remarkably diminished.

THE PROPAGATION OF DISEASES BY MEANS OF INSECTS.—*W. M. L. Coplin, M.D.* Manson's studies bearing on the inoculation of man by filaria-infected mosquitos may be taken as fully admitted, and the possible dissemination of leprosy by mosquitos is supported by the experiments of Alvarez, who permitted the mosquitos to feast on the leprosy sores, and by suitable staining demonstrated within the mosquito organisms which could not be differentiated from the *Bacillus lepræ*. The work of Smith and Kilbourne (1892) on the activity of the tick in the propagation of Texas fever need only be mentioned, as it established a clear chain of evidence.

In support of the belief that bedbugs may disseminate disease, Denevre observed that the brother of a patient dead of tuberculosis acquired the disease from sleeping in the bed previously occupied by the deceased. Examination of the bedbugs, that were present in large numbers, showed that 60 per cent. possessed the power of infecting guinea-pigs. A fly travelling over an infected surface becomes laden with bacteria, and can infect a wound, and food and drink. Apparently the fly has a striking fondness for the sputum of phthisical patients, and, as pointed out by Joly, infects the food, milk, etc., of others, or even exposed or neglected wounds or sores. In experiments in the laboratories insects were caused to walk over the growing culture in an agar-agar plate, and then after intervals of varying lengths the insects, which had been kept under natural conditions, were caused to walk over sterile culture plates. In this way the *Bacillus typhosus* was demonstrated ninety-six hours after infection of the insect. The experiments prove the assertion that any system of disinfection which does not destroy the material transported, and render the carrier harmless, is insufficient and unsatisfactory, and therefore undesirable.—*Philadelphia Medical Journal*, through *Pacific Medical Journal*.

SMALL-POX IN HULL, AND EXPERIENCES OF THE WORKING OF THE VACCINATION ACT, 1898.*

By J. WRIGHT MASON, M.B., D.P.H.

Medical Officer of Health of Kingston-upon-Hull C.B.

WHEN asked by the President to contribute a paper to this Society, I thought my recent experiences of small-pox in the city of Kingston-upon-Hull, and of the working of the Vaccination Act of 1898, might prove interesting, and evoke discussion.

Isolated cases of small-pox occurred in Hull at the commencement of March last, and the disease has increased in prevalence more or less since that period. Up to September 30th 232 cases had been admitted into the hospital. Of this number forty-two have proved fatal, yielding a fatality rate equal to 18.1 per cent. of the total admissions. Of forty-three cases admitted showing no evidence of vaccination, twenty-four have died, equal to 55.8 per cent. of such cases, while of 189 patients showing good or indifferent evidence of primary vaccination eighteen have died, equal to a fatality rate of 9.5 per cent. Of the total number of cases notified, four only have been, for various reasons, treated outside the hospital.

The disease was no doubt imported. The earlier cases were of a mild character and unrecognised, and occurred mostly amongst the labouring classes employed on the docks.

At the end of this paper will be found statements showing:

(a) Districts, population, number of cases admitted into hospital, and the mortality in age periods in the respective registration districts.

(b) Particulars of the fatal cases as to sex, age, and vaccination; and

(c) The condition as to vaccination on admission of patients into hospital.

No case has occurred subsequent to revaccination, except where the operation has been performed at an infected centre, and the disease has evidently been contracted before revaccination. There has been no case of the disease among the officials associated with the hospital, or those who have been engaged in repairs and the removal of the temporary hospital accommodation to the recently

* Read before the Yorkshire Branch of the Incorporated Society of Medical Officers of Health, October, 1899.

tion of all small-pox patients treated in hospital has to be recorded, copies of which can be procured by the public, and used as evidence or otherwise for verification as to vaccination. It is sometimes extremely difficult to recognise the evidences of vaccination when inefficiently performed on admission of the patient into hospital, hence a mistake may occasionally arise as to whether the person has been vaccinated or not. Such error may be used by those who are opposed to vaccination as a reason against its good effects. The profession should, therefore, insist upon thorough vaccination or no vaccination.

According to the special return relating to vaccination recently furnished to the House of Commons, the total number of successful primary vaccinations in England and Wales during the periods between January 1st and June 30th in the years 1898 and 1899 respectively, were as follows:

1898.	1899.
278,588	355,987

There were, therefore, 77,399 more primary vaccinations in the first six months of this year than in the corresponding period of 1898, being an increase of 27.78 per cent.

Of the 646 unions from which particulars were received, 479 show an increase, and 165 a decrease, whilst in two the numbers were identical in the two periods mentioned. Many of the Yorkshire cities and towns show considerable increases in the numbers of vaccinations, amongst which the following are the most notable, viz.:

EAST RIDING.

Kingston-upon-Hull, Sculcoates... 672

NORTH RIDING.

Scarborough... 170
Whitby... 112
Malton... 163

WEST RIDING.

Bradford... 501
Dewsbury... 1,725
Halifax... 591
North Bierley... 860

Additional legislation for the renewal of the vaccinal protection at adolescence is still as necessary as before, and, as has been

TABLE A.—Age-groups.

District and Population.	0		1		5		15		25		35		45		55		65		75		80 and up.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
36,351, Drypool	1	1	3	3	12	2	27	...	23	5	9	2	6	2	1	...	...	...	...	...	...	83	15	
14,860, Sutton	...	...	...	...	2	...	...	...	3	1	...	...	...	1	...	...	...	...	...	...	...	5	3	
15,429, E. Sculcoates	...	...	...	...	3	1	8	...	1	...	1	2	1	...	1	...	...	...	...	...	...	15	3	
46,715, W. Sculcoates,	1	...	1	1	2	1	9	2	8	2	6	1	1	1	...	...	...	...	...	...	1	28	9	
39,588, Humber	1	...	2	...	2	1	9	1	2	3	6	1	...	...	1	...	...	...	...	...	...	23	6	
47,858, Myton	...	...	...	1	2	...	7	...	11	1	...	1	...	1	1	...	...	...	1	...	...	21	5	
23,632, Newington	...	...	...	...	...	...	5	1	5	...	2	...	...	...	...	...	...	...	...	...	...	12	1	
8,425, Newland	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	2	...	
1,045, Stoneferry	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	
297, Marfleet	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
234,270, Total	3	1	6	5	23	5	65	4	55	12	24	7	8	5	4	1	1	1	1	1	1	190	42	

TABLE B.

41 patients have died, viz., 25 males and 16 females, viz.:

Date of Death.	Sex.	Age.	Particulars of Vaccination.
12th April	Female.	28 years.	No evidence of vaccination from marks.
15th April	Male.	55 years.	No evidence of vaccination from marks.
28th April	Female.	6 years.	No evidence of vaccination from marks.
30th April	Female.	3½ years.	No evidence of vaccination from marks.
1st May	Female.	16 mths.	No evidence of vaccination from marks.
7th May	Male.	38 years.	One indifferent mark.
15th May	Male.	45 years.	No evidence from marks.
21st May	Male.	44 years.	Four good marks.
21st May	Male.	44 years.	Two good marks.
22nd May	Male.	28 years.	No evidence of vaccination from marks.
24th May	Male.	14 years.	No evidence of vaccination from marks.
8th June	Male.	3 years.	No evidence of vaccination from marks.
14th June	Male.	35 years.	One good mark.
18th June	Male.	57 years.	No evidence of vaccination from marks.
25th June	Female.	9 days.	No evidence of vaccination from marks.
26th June	Male.	28 years.	No evidence of vaccination from marks.
26th June	Female.	23 years.	One good and two indifferent marks.
30th June	Female.	22 years.	No evidence of vaccination from marks.
2nd July	Male.	28 years.	Three indifferent marks.
2nd July	Male.	31 years.	No evidence of vaccination from marks.
6th July	Female.	29 years.	No evidence of vaccination from marks.
7th July	Male.	25 years.	Three good marks.
8th July	Male.	48 years.	Three good marks.
8th July	Female.	40 years.	Three indifferent marks.
11th July	Male.	80 years.	One indifferent mark.
24th July	Male.	28 years.	Three good and one indifferent marks.
24th July	Female.	48 years.	Three good marks.
7th August	Male.	23 years.	Three good marks.
12th August	Female.	42 years.	Three good marks.
15th August	Male.	26 years.	Four good marks.
15th August	Male.	5 mths.	No evidence of vaccination from marks.
25th August	Male.	25 years.	Two good marks.
1st September	Female.	12 years.	No evidence of vaccination from marks.
7th September	Male.	66 years.	Four indifferent marks of vaccination.
10th September	Male.	17 years.	No evidence of vaccination from marks.
15th September	Male.	7 years.	No evidence of vaccination from marks.
15th September	Male.	7 mths.	No evidence of vaccination from marks.
17th September	Female.	29 years.	No evidence of vaccination from marks.
20th September	Female.	39 years.	No evidence of vaccination from marks.
21st September	Female.	21 years.	No evidence of vaccination from marks.
24th September	Female.	1 year.	No evidence of vaccination from marks.

TABLE C.

Tabulated Statement of Particulars as to Vaccination of Patients on Admission to Hospital.

(From March 2nd to September 30th, 1899.)

Good Marks.					Indifferent Marks.					Total.		No Evidence of Vaccination from Marks.		Grand Total.	
Cases	Deaths	1			2			3			Total.	Cases	Deaths	Cases	Deaths
		1	2	3	1	2	3	1	2	3					
22	2	39	2		10	15	35	10	60	6		13	24	232	42
Percentage of deaths, 9.3.		Percentage of deaths, 10.0.										Percentage of deaths, 55.8.		Percentage of deaths, 18.1.	

stated in the *British Medical Journal*, the existence of the conscientious clause affords a natural and logical opportunity of establishing a national system of revaccination, and with that conclusion I most cordially concur.

I will conclude by reminding you that a community protected by vaccination, notification of infectious diseases, and the provision of sufficiently isolated hospital accommodation, is exposed to little risk of the epidemic spread of small-pox and its consequent dislocation of trade and commerce, which are so dependent upon the health and welfare of the community, and upon which, again, the prosperity of a nation so largely depends.

THE TRANSMISSION OF THE TUBERCLE BACILLUS THROUGH THE PLACENTA.—Auché and Chambrelent review the literature of this subject and report a new case in the *Archives de Médecine Experimentale*, vol. ix., No. 4, 1899. They come to the following conclusions:

1. The number of satisfactorily proved cases of transmission of the tubercle bacillus from the mother to the fœtus is very limited, since we have been able to bring together but twenty, including our own.
2. This transmission is more to be feared when the tuberculous lesions in the mother come on very rapidly and are widely generalized.
3. Such transmission has never been observed before the end of the fifth month of pregnancy.
4. In all the cases in which it has been examined the placenta has been found tuberculous, both microscopically and from inoculation experiments. It seems, therefore, that it is the first seat of infection, and that the bacilli colonize in it before invading the blood.
5. The fœtal tissues can be infected with the tubercle bacillus without presenting any specific lesion either to the naked eye or microscopically.
6. When tuberculous lesions exist in the fœtus they are usually found in all, or nearly all, the organs; rarely they are sharply localized.
7. Except in the cases of Schmorl and Kockel, where the infection was localized in the adrenals, there have generally been large, even enormous numbers of tubercle bacilli in the neighbourhood of the lesions.
8. The fœtal tissues are not therefore a poor soil for the tubercle bacillus, and Baumgarten's hypothesis of latent tuberculosis, based upon an opposite view, is disproved by this evidence.—*Albany Medical Annals*.

EMERGENCY MEASURES IN SMALL-POX.*

By L. J. WEATHERBE, M.B., C.M.,

Medical Officer of Health of Rotherham R.D.

ABOUT two o'clock on Tuesday, September 26th, I received a message by telephone that there were cases of small-pox on the canal-boat *Wonder*, then at Roundwood, in the parish of Dalton. On arriving on the scene, I became acquainted with the following facts:

The *Wonder* left Hull on August 7th with a cargo of deals, arriving at Mexbrough September 16th. The crew and passengers consisted of a man, woman, and four children.

On September 14th the youngest child was taken ill with what the mother considered to be measles. Two days later a doctor was called in, who pronounced the case small-pox, and on September 18th the child died and was buried.

A clean bill of health was given the master by the Medical Officer of Health of Mexbrough on September 20th, and the *Wonder* proceeded on her voyage, and arrived at Roundwood on the 23rd.

On September 24th the woman and two children fell ill, and on the 26th the remaining child was seized. At this time all the occupants, except the man, were suffering from small-pox. The man and woman had been successfully vaccinated in childhood. None of the children had ever been vaccinated. Our Surveyor had gone to the boat on the morning of September 26th, having received information of the outbreak early. He found the occupants of the boat absolutely destitute, without food or money, and with very little clothing. He very properly immediately procured some milk and brandy, and administered a dose of the mixture to each patient. The sufferers were then huddled together in a stuffy little bunk in the cabin at the stern of the boat, measuring 3 feet 6 inches in width by 6 to 7 feet in length and 2 feet in height. After inspecting the boat and surroundings, I met the Surveyor, and discussed the best means to be taken to prevent a spread of the disease.

As we are unprovided with a small-pox hospital in the Rotherham Rural District, and as this canal-boat was stationed within a few hundred yards of a considerable population in the Borough of Rotherham, we speedily came to the conclusion that the best mode

* Read before the Yorkshire branch of the Incorporated Society of Medical Officers of Health, October, 1899.

Fellmongers.—Fellmongering is scheduled in the list of offensive businesses, but it is not so offensive as many people suppose. There is a certain smell of animal matter on the premises, not beyond them. It would ruin the business if this animal matter were allowed to get into a state of decomposition. Persons working in the trade are not subject to any particular disease, and enjoy the same average life as other folk. Glue and size-boiling are offensive if the materials become decomposed before boiling. In that case the process should be conducted under cover, and the effluvia be carried off in a shaft.

Fur-pulling.—In fur-pulling the long hairs are removed from rabbit-skins and the down left for the purpose of manufacturing a kind of expensive fur from a cheap material. This work used to be carried out in private dwellings, but at the present time I know of only one house in my district where it is so carried on, and in that house there is a separate room for the purpose. In some factories no less than forty women are employed in this business, which creates a great deal of rather offensive dust. The women come from all parts of London to these factories, and I cannot find any living in Bermondsey. On this account it is difficult to connect any fatal disease with this particular business because such deaths do not occur in the district where the factory is situated, and most of these women being married the deceased would be described in the death returns not as "fur-pullers," but, may be, as the "wife of a labourer."

Meat Extracts.—Of late years there has grown up the manufacture of various kinds of foods. Recently some fifty or sixty tons of liver which had come from Germany were found to be in a specially rotten and decomposed condition. From these livers it was intended to make extract of meat, to be sold in penny tins as suitable for breakfast for working-men. Proceedings were taken in that case, and a penalty of £50 and costs inflicted.

Jam-making.—I have no doubt that no small quantity of fruit which we would not put on our own tables has been used for making jam. If the decomposition be only slight, no doubt its products would be broken up in the boiling, because by reason of the sugar and altered specific gravity the boiling-point would be sufficiently high. If any large quantity of fermented fruit be used the jam is sometimes made pleasant in flavour and colour by the addition of some description of juice. Such jam would be very apt to affect children who might consume it in any considerable quantities. Sanitary Authorities ought to take steps to prevent manufacture of such unwholesome or injurious jam. A great

deal is done to check adulteration, much of which does very little harm, and surely, when we have reason to suspect that harm will arise, some steps should be taken.

Bermondsey has had an evil reputation for bad smells, which was probably deserved about fifty years ago, but such is not the case now, and has not been for many years.

Not long ago some sensational articles about the parish were published in the magazines and newspapers. So far as the sanitary officers knew, or could ascertain, the alleged facts were gross exaggerations, or pure fiction, or had reference to places outside the boundaries of the parish.

DISCUSSION.

Dr. GWYNN, in proposing a vote of thanks to the President for his address, remarked that in his district (Hampstead) none of the nuisances described by Dr. Dixon were known to exist, but there were others of an entirely different nature. Perhaps that arising from peat-moss manure was the greatest they had to deal with at present. Sometimes there were great nuisances from brick and clay (ballast) burning. About sixteen years ago the Hampstead Vestry took action to putting down some brick-fields close to the site of the North Western Hospital. Application was made for an injunction, and after a lengthy hearing the Judge inspected the fields and granted the injunction. The action cost the Vestry £800. It was always difficult to prove that the best available means had not been taken to prevent any nuisance. Brick-burning was still carried on by one man in the district, but they had not had a single complaint with reference to his works, so that it would seem to be possible to burn bricks without creating any nuisance.

Dr. ALLAN, in seconding the vote of thanks, said perhaps no medical officer of health in London had had more experience in the various trade nuisances than Dr. Dixon. They were thankful these various trades had been centred in Bermondsey, because Dr. Dixon had thereby been enabled to some extent to make a speciality of that particular branch of their work, and it was exceedingly interesting to them to hear his experiences. With reference to the mortality due to various trades in the returns usually obtained, the deaths of masters and workmen were not distinguished, and it was somewhat difficult to differentiate the mortality prevailing among any particular class. On the subject of jam-making Dr. Allan said that in the prosecutions which had lately taken place the fact that it was quite impossible to make good jam out of bad fruit had not been overlooked. No amount of "faking" would make a presentable article if the fruit is bad. It would be unpleasant to eat or to look at, and no retailer would venture to sell it. Anyone making such jam would ruin his own trade. He had seen a very large amount of fruit during the last summer in various stages of decomposition and fermentation. He believed that the very small amount of fermentation often found in fruit had no detrimental effect on the manufacture of jam.

TUBERCULOUS MEAT: UNIFORMITY AS TO SEIZURE.*

By WILLIAM BERRY, F.R.C.S.I.,
Medical Officer of Health of Wigan.

As there is considerable difference of opinion amongst medical officers of health and meat inspectors as to the seizure of tuberculous meat, I have taken the liberty of inviting discussion here to-day to see if we can arrive at some definite idea as to what is "localized" and what "generalized" tuberculosis.

If we start with the assumption that tuberculosis is a systemic affection, and therefore cannot be localized, we have a definite line to work upon, and then the flesh of all beasts in which a trace of tuberculosis is discovered must be condemned and destroyed. This, no doubt, was the view held by many before the issue of the report of the Royal Commission on Tuberculosis in 1898, for I find in Vacher's "Food Inspector's Handbook, 1892" (p. 34), the following:

"There has been much discussion as to whether the carcasses of all animals infected with tuberculosis should be held as unfit for human food. Indeed, many years ago it was generally allowed that if the disease was *apparently limited to the lungs*, and not far advanced, and the carcass looked well, the inspector would be justified in passing the meat. However, this is not the approved view now."

And further:

"The disease is, therefore, not to be regarded as localized because it is only apparent in the lungs, for through the lungs circulates the whole blood, and sooner or later the bacillus is carried into the system."

Then he quotes the report of a departmental committee on tuberculosis, which, reporting on July 16th, 1888, expressed the opinion that, "although the bacilli may be found but rarely in the flesh, still the chance of their being present either there or in the blood is too probable to ever allow the flesh of a tuberculous animal being used for food under any circumstances either for man or the lower animals." Then, again, Professor Walley in his book, entitled a "Practical Guide to Meat Inspection," says (p. 157):

"At the Paris Congress of 1888 a resolution was passed (there being only three dissentients) in favour of the total seizure

* Read before the North-Western Branch of the Incorporated Society of Medical Officers of Health, November, 1899.

and destruction of all flesh derived from tuberculous animals, whatever the extent of the specific lesions found in such animals."

The same author mentions that since the holding of the Paris Congress of 1888 the following decree has been promulgated in France, and I quote this to show what were considered as generalized lesions:

"The flesh of tubercular animals shall be excluded from consumption—

(1) If the lesions are generalized, that is to say, not confined exclusively to the visceral organs and their lymphatic glands;

(2) If the lesions, although localized, have invaded the greater part of an organ, or are manifested by an eruption on the walls of the chest or abdominal cavity."

On the occasion of a second sitting of the International Congress held at Paris on September 2nd, 1889, the following important resolution was (with four dissentients only) adopted:

"There is reason to prevent the consumption by men or animals of the flesh of tuberculous animals, mammals or birds, whatever the degree of tuberculosis, or whatever the apparent quality of the meat."

Now, since that time we have in this country had two Royal Commissions on Tuberculosis, the first in 1890, and the second 1895-98, experiments having been made for both Commissions with tuberculous meat. The secretary of the last Commission in a joint work on "Cattle Tuberculosis" says:

"There can be no doubt that in the past a great quantity of meat has been destroyed by the officers of local authorities which might very well have been consumed, because it has been found that only rarely does the tubercle bacillus lodge in the muscular substance itself; and provided the organs containing the tuberculous deposits are destroyed, the meat itself may be sound."*

After speaking of the findings of the first Royal Commission, which reported in 1895 that bovine and human tuberculosis were identical, and that risk of acquiring tuberculous disease was incurred by taking tuberculous matter into the body, the second Royal Commission reported as follows:

"At the same time, we think that there has been a tendency in some minds to exaggerate the extent of the risk arising from meat."†

"As to the amount and distribution of tuberculous disease which justifies the seizure and condemnation of a carcass as

* "Cattle Tuberculosis," by Legge and Sessions, Introduction, p. ix.

† Paragraph 11 of Report.

unfit for human food, the widest discrepancy prevails in opinion and practice. Chaos is the only word to express the absence of system in the inspection and seizure of tuberculous meat, and it has in our opinion become necessary that regulations should be formulated for the guidance of those who are concerned in dealing with this subject.

"In Belfast the presence of tuberculosis in any degree is held to be ground for seizure; on the other hand, in Islington the veterinary inspector of the Corporation of the City of London only seizes those carcasses wherein tuberculosis is generalized and the meat in poor condition. In Dublin the medical officer of health used to seize on the slightest evidence of tuberculosis, but he has recently modified his views, and only seizes carcasses which are somewhat extensively affected. In Sheffield seizure is made of a carcass showing the slightest trace of tuberculosis. In Manchester, in cases where the disease is localized, the affected part is removed and destroyed, the remainder is passed.

"Numerous instances of similar discrepancy will be found in the evidence. The above, taken almost at random, may be sufficient to illustrate the present condition of inspection applied to tuberculous carcasses.*

Then in paragraph 23 we have the following statement:

"Producers and traders are making no unreasonable demand when they ask that a recognised standard should be observed, and that meat which, after effective inspection, is pronounced fit for sale in one market, should not be liable to seizure in another because the inspecting authority happens to differ in opinion as to the extent of tuberculosis which may be dangerous."

"Again in paragraph 25 we have it stated that such a stage of experience and knowledge has been attained as to the nature of tuberculosis and the effect of tuberculous meat upon the human consumer as to enable a uniform standard to be prescribed for the guidance of meat inspectors; and, further, the Commissioners say that, "Assuming that seizure of meat should be confined to such as is dangerous to human health, we entertain no doubt that in certain places a great deal of meat is seized which is perfectly safe and wholesome food," and "that some limit should be observed in the latitude permitted to medical or veterinary officers in fixing independent standards of soundness in different places."

I think it would be well, therefore, if we could adopt some kind of standard of uniformity as to what should be considered "generalized" and what "localized" tuberculosis. The conclusion of the Royal Commission as to the principles which should be observed in the inspection of tuberculous carcasses of cattle are as follows:

1. The entire carcass and all the organs may be seized,
- (a) When there is miliary tuberculosis of both lungs.

* Paragraph 22.

(b) When tuberculous lesions are present on the pleura and peritoneum.

(c) When tuberculous lesions are present in the muscular system, or in the lymphatic glands embedded in or between the muscles.

(d) When tuberculous lesions exist in any part of an emaciated carcass.

2. The carcass, if otherwise healthy, shall not be condemned, but every part of it containing tuberculous lesions shall be seized,

(a) When the lesions are confined to the lungs and the thoracic lymphatic glands.

(b) When the lesions are confined to the liver.

(c) When the lesions are confined to the pharyngeal lymphatic glands.

(d) When the lesions are confined to any combination of the foregoing, but are collectively small in extent.

These instructions seem to me to be pretty conclusive as to what the Royal Commissioners thought to be "general" and what "local" tuberculosis, and I abstract the following from Legga and Sessions's book on "Cattle Tuberculosis":*

"Tuberculosis in cattle, as found by post-mortem examination, generally occurs in one or two forms:

1. Where organs and their glands only are affected;
 2. When there has been invasion of the serous membranes.
- The former is the more frequent form in cattle, and the latter is almost invariably secondary to disease of the organs. In meat inspection the point that is of the utmost importance to decide is whether an animal is affected with localized or generalized tuberculosis. The term 'localized' is used when the disease is limited to one organ or spreads to another organ by contiguity or by the lymphatic channels, or through the portal circulation (i.e., the circulation between the intestinal tract and the liver), but not by means of the general blood-stream of the body. As examples of it are tuberculosis of the retropharyngeal lymphatic glands with tuberculosis of the lungs and bronchial lymphatic glands, tuberculosis of the intestines and mesenteric lymphatic glands, tuberculosis of the lungs and pleura, tuberculosis of the intestines and liver.

"By 'generalized' tuberculosis is meant the spread of the disease by the passage of tubercle bacilli into the main blood-stream, or into the thoracic duct, and their conveyance thence to different organs and parts of the body, such as the lungs, liver, spleen, kidneys, bones and muscular tissue. If the bacilli in this case enter in large numbers into the blood-stream, then acute miliary tuberculosis (galloping consumption) results; but it by no means follows that in generalized tuberculosis all the organs and tissues become equally infected. Some tissues offer a particular resisting power to the organisms. The lungs are always attacked, then come in order the abdominal organs, the serous membranes, the lymphatic glands of the muscular tissue, the udder, kidneys, and lastly the bones."

* Op. cit., p. 51.

Professor Ostertag, of Berlin, the highest authority on meat inspection in Germany, believes that tuberculosis of the serous membranes only rarely leads to a generalization of the disease, except the disease commence in the uterus, and looks on deposits on them as a local condition. This certainly is not my view, for if we have extensive deposits on the pleura and peritoneum they are evidence of generalized tuberculosis. It has been proved by the experiments made in feeding animals that the muscular tissue of tuberculous animals as a rule contains no bacilli, or at least not enough to cause disease in the animals experimented on, and that for the flesh to be injurious we must have a high degree of tuberculosis. In conclusion, I would say that if we have a well-fed beast with lesions such as are classified in the first group of recommendations of the Royal Commissioners, we should condemn; and if on the other hand we have a well-fed beast coming under the second category of recommendations, it should be passed after eliminating the affected parts. If the carcass be wasted and the flesh slimy and soft, we should be justified in condemning it, although the evidence of tuberculosis was only slight. I know there may be cases in which it is a matter of opinion as to which head the carcass may come under, but as a general rule, unless we have evidence of acute miliary tuberculosis, the condition of the carcass must be considered. With numerous deposits in the pleural cavity, on the upper and under surface of the diaphragm, and the peritoneum well studded, although the lungs or liver may not be much affected, I think the extensive surface of deposit justifies the conclusion that we have general tuberculosis. It is quite evident from the findings of the last Commission that we must retreat from the method of seizing all carcasses that are affected with tuberculosis, and must have a definite idea as to what constitutes "local" and what "general" tuberculosis.

DISCUSSION.

Professor DELÉPINE thought that little exception could be taken to the findings of the Royal Commission, although some points might give rise to misconception. With regard to the earlier measures that were taken, which are now regarded as too severe, they were framed when the exact distribution of the tubercular virus was not so well understood; they were tentative and perfectly correct according to the knowledge of that day. Everyone acknowledged that the carcass should be destroyed when the virus had passed into the blood-stream, and the same danger existed when lymphatics embedded in the muscles were affected. Professor Delépine then referred to the difficulties in carrying out the recommendations, as exemplified by the recent Birkenhead meat case. He said it seemed to be necessary to get some third person to examine the lesions microscopically, as neither the evidence of the medical officer of health nor of the inspector was accepted as absolute proof of the presence of tuberculous lesions.

Dr. YOUNG thought the instructions good, and that they could not do otherwise than follow them.

Dr. WHEATLEY said that the recommendations were seen, if examined care-

fully, to be stringent. There were few cases, except those with small localized lesions, in which the pleura and peritoneum, or some glands embedded in muscles, were not affected. There was no direction given for those cases in which the lungs and one of the abdominal organs were affected.

Dr. SERGEANT thanked Dr. Berry for introducing this interesting discussion. He spoke of the difficulties that had to be encountered years ago, and said that they seemed to be increasing rather than decreasing. It appeared as if a bacteriological laboratory, absolutely at the disposal of sanitary authorities, established for this and other work, would become a necessity.

PARAFFIN AS ADULTERANT OF MARGARINE. — It is so commonly assumed that margarine is invariably a wholesome food, that the evidence on the subject given by a chemist, Mr. J. F. Geisler, in a paper prepared for the American Chemical Society, deserves consideration. He states that paraffin has been found at different times in a number of samples of margarine, in proportions ranging from 5 to 11½ per cent. He first detected it in 1893, and reported the fact to the New York State Department of Agriculture, whose experts afterwards found a considerable number of samples of margarine containing paraffin to the extent of 9.72 to 11.25 per cent. The publicity given to the subject at that time led to a temporary discontinuance of the use of paraffin in such large quantities, and it was not until the present year that Mr. Geisler again noticed the presence of the adulterant in the course of his customary analyses of margarine. During the last few months, however, he has found 5 to 11.76 per cent. of paraffin in samples of margarine sold in shops in New York and Brooklyn, either as margarine or as butter. The object of the use of paraffin, Mr. Geisler explains, is to make a thoroughly homogeneous mixture of the several fats and oils by preventing their separation, thus improving the consistency and appearance of the margarine, and rendering its distinction from butter by physical tests difficult. As the paraffin is probably introduced in the oleomargarine (the oil), of which margarine is mainly composed, and by far the greater portion of that oil used in Europe comes from the United States, it is almost certain that the adulterant will be found in margarine sold in this country if chemists search for it. Then it will be a question for medical authorities to decide as to whether the paraffin, in the proportions found, is likely to be distinctly injurious to the health of consumers of margarine. — *Standard*.

THE PREVENTION OF PLAGUE THROUGH THE SUPPRESSION OF RATS AND MICE.*

By DR. DORIGA,

Provincial Medical Officer of Health, Venice.

(Continued from p. 98.)

ANOTHER bacillus which, like that of Löffler, is met with only in commerce was discovered, but very imperfectly described, by Danjsz† at the end of 1895, who isolated it from mice during an epizootic which spontaneously occurred in the laboratory, and named it the *Coccobacillus murium*. It is short and thick, but presents various and dissimilar forms. It develops quickly and regularly at a temperature of 18° to 20° C. On gelatine, and also on agar, it gives round colonies which, when they develop together, assume a dirty gray colour with pale yellow shades. According to the discoverer, this bacillus is pathogenic for all kinds of house-, field-, or wood-mice, and migratory and common rats. For the latter Danjsz prepared a stronger virus (No. 2)‡ by means of cutaneous injections and successive inoculations from animal to animal. It is harmless to man and all domestic animals.

Zupnik, who studied this bacillus comparatively with that of Löffler, found the virus to consist of a mixture of bacilli and cocci, more numerous in the first preparation than in No. 2; but after transmission through different animals it is possible to isolate those bacilli only which in microscopical appearance, cultures in broth and sweet gelatine, greatly resemble those of Löffler. He concludes that with regard to pathogenic power the *Bacillus typhi murium* is absolutely preferable to the *Coccobacillus murium*, because, whilst the first kills field-mice in ten days, the latter is only fatal in fourteen. It has not been tried on rats.

In 1892, Laser,§ at the Institute of Hygiene of Königsberg, also isolated from sick mice a short, very motile bacillus of a length equal to twice its breadth, staining better at the ends than in the centre. Field-mice infected by the mouth died in six, white mice in four days. After Löffler's experiments in Thessaly, Laser studied

* Translated from the *Revue d'Hygiène*, August, 1899, by H. E. A.

† The bacillus of Löffler is sold commercially by Schwazlose jun., Berlin, and that of Danjsz at the Pasteur Institute.

‡ Danjsz, 'Maladies Contagieuses des Animaux Nuisibles,' *Annales de la Science Agronomique*, 1895, vol. i.

§ Laser, *Cent. f. Bakt.*, 1891, xi., p. 184; 1893, xiii., p. 184; 1894, xvi., p. 33.

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his bacillus, and found it to be harmless to the *Mus agrarius*, to cats, pigeons, geese, horses, pigs, or cows. Two sheep became ill and died, but at the autopsy the bacillus was not found in the organs. He states that he obtained satisfactory results in two trials in the field in Russia. Laser's experiments with this bacillus have not been repeated by any other person.

Mereshkowsky* also, who studied Löffler's bacillus in 1884, published in the following year the results of his researches on a malady very prevalent among a species of marmot (*Zieselmäuse spermophilus musicus*) in the district of Samara, Russia. The bacillus isolated by him closely resembled that of Löffler, but differed from it in not developing gas in sugared gelatine. House-mice infected by mouth died between the sixth and twelfth day, field-mice between the third and seventeenth. Rats (*Mus decumanus*) also were capable of infection, but showed only slight susceptibility. The bacillus was harmless to domestic animals. Experiments in the field yielded satisfactory results when tried by means of a cake made of rye flour and broth culture of the bacillus. This bacillus has not been studied by other experimenters.

The micro-organisms above described are the only ones with which the destruction of mice has been tried or proposed. Although the aim of the experimenters has been to obviate the harm to agriculture through these rodents, the pathogenic action of bacteria has been principally studied with regard to *arricobæ*. As regards other species, the facts we know are insufficient or negative.

In the investigation of a micro-organism destructive to mice in reference to the prevention of plague, its action on species living habitually in contact with man should be taken into account, the more so since the field-mouse appears endowed with slight susceptibility as regards this infection.†

Existing conditions in the greater part of our town dwellings have given the exclusive dominion of the basement, in India as in Europe, to a single species of rat, viz., the *surmulot*,‡ or *Mus decumanus*, which has nearly everywhere driven out the black rat and others of the mouse species. In the basement, also, and in the interior of our houses the gray domestic mouse is still more common. Nevertheless, mice are, on the whole, only half as numerous as rats, although more prolific, because their places of concealment

* *Cent. f. Bakt.*, 1895, xvii., p. 742; 1896, xx., pp. 85 and 176.

† Abel, 'Sur la connaissance du bacille de la peste,' *Cent. f. Bakt.*, xxi., p. 497. One field-mouse survived the injection, and one died after six days; whilst one house-mouse died on the third day, and another on the fourth.

‡ The *surmulot* comes from India and Persia. It appeared in Russia in 1727, and in England, France, and Italy towards 1750.

are more accessible, and their mode of life renders them more subject to capture by man and animals.

We have not sufficient information to show which of the two species is the more susceptible with regard to plague. During the Bombay epidemic some observers considered that mice remained immune whilst rats died in great numbers. On the other hand, Simond at Bandora, and Bitter at Jeddah, reported that the mortality was great among rats and mice alike. Probably this discrepancy is due to the different behaviour of the two kinds of animal during the later moments of life. Rats, to escape from the sense of suffocation, come boldly out for fresh air, whilst the weaker and more timid mice die in their holes.

The results obtained in the laboratory are not much more instructive than observed epidemiological facts. Yersin and Hankin have shown that rats are more susceptible to plague than mice when infected by the gastro-intestinal tract, and conversely when the infecting matter is introduced subcutaneously; that the virulence of the bacillus is attenuated in passing from rat to rat, but that, on the contrary, it is intensified between white or gray mice. Since infection by the stomach appears the most ready and most common, it may be supposed that rats, under natural circumstances, are sources of greater danger than mice. But Yersen, Calmette, and Borrel* have demonstrated that in rats and mice alike infection by ingestion is not successful in causing plague due to human sources—at all events, when it has not had more than two or three transmissions through animals. If the digestive tract be the only dangerous channel, it must certainly be granted that mice are more refractory than rats, but with the latter the virulence soon becomes reduced if not maintained by frequent transmissions through man. Numerous observations appear to prove that the epizootic may last for a long time independently of man.

To explain the transmission of plague from the rat to man, Simond and Hankin have been led to admit the intervention of insects capable of transporting and inoculating the specific bacillus, as if this intervention could explain the relations between the disease in rats and in mice.

Regarding the question from the standpoint of general protection, rats are certainly more dangerous than mice, because of their greater ability to transport infection from place to place. What above everything makes these animals dangerous is their migratory

* Yersen, Calmette and Borrel, 'Peste Bubonique,' *Annales de Pasteur*, 1895, p. 589.

instinct, which becomes an uncontrollable scourge, carrying contagion from rat-holes into uninfected or already disinfected houses, distant quarters of a city or adjacent countries.

It has been observed in India that the general use of certain strongly-smelling disinfectants, such as carbolic acid, has the effect of driving away rats and mice. To prevent sick mice from leaving infected areas, Hankin proposes the use of inodorous disinfectants within these areas, and others of disagreeable smell at their margins and within surrounding uninfected zones. But it is questionable whether such a precaution will answer, since many towns have rat-runs both above and below the street pavements, along which the rodents may escape this form of sanitary cordon, so that it is not easy to intercept all of them. It soon becomes necessary to resort to means of destruction or expulsion of rats and mice from places inhabited by man, inasmuch as, if plague appears among them, nothing can check their emigration. Nevertheless, action to this end may have a contrary effect—in other words, may lead to a more rapid dissemination of the epidemic.

By chemical, mechanical, or physical means, and the use of the micro-organisms before mentioned—all of which have been found efficacious in this respect—the destruction of house-mice may be secured. In houses careful attention to the recommendations laid down as to the practical use of the above-named micro-organisms will succeed. On the other hand, the use of chemical or mechanical means will never be sufficient to destroy rats, but these measures may—in default of others—serve to exclude rats from dwellings. When circumstances allow of the closure of the drains and cellars, asphyxiating gases, smoke, sulphurous acid, bisulphide of carbon, etc.—or even flooding of these—may be employed with benefit.

No useful result against rats is to be anticipated from the employment of micro-organisms. The *Achorion Schönleinii* is pathogenic to man, but of slow and doubtful action in the case of the rodents. The bacilli of Löffler, Laser, and Mereshkowsky have no effect on them. The pathogenic effect of the coccobacillus of Danysz, and especially the diffusibility of the disease it produces, have not been sufficiently satisfactorily demonstrated.

We know of many other bacteria pathogenic to mice, since these animals are so commonly employed in laboratory experiments. But for the very reason that rats are hardly ever made use of in the laboratory, our knowledge of their receptivity in respect of micro-organisms is most imperfect, and cannot be applied practically. The importance, however, of the part played by rats in the

spread of epidemic plague establishes the necessity of studying the most suitable means of securing their prompt destruction.

The French Government has not failed to consider this question, and has charged the Consultative Committee of Public Hygiene with its investigation. Certain navigation companies have already made great efforts to get rid of rats—which are so often the cause of heavy losses—sometimes even as much as several thousand francs for a single cargo. Notably in this respect may be named the Compagnie des Chargeurs Réunis, who have arranged with a special contractor for the destruction of the rats on their vessels, and are also taking the most strict measures possible at the ports of embarkation. The Compagnie des Messageries Maritimes give their sailors a prize for the dead body of every rat caught on board, and this step has led to the destruction of large numbers.

Adopting the practice of the shipping companies, the committee have resolved to proceed methodically with the application of these and similar measures in hospitals and ships. As rats on ship-board are often very numerous, and the recesses in the cargo and structure where they take refuge many and difficult of access, the problem is by no means an easy one to solve. But, as is well known, satisfactory results may be obtained by care and attention; and with this view the following instructions recommended by Dr. A. J. Martin, and approved by the committee have recently been adopted by the President of the Council, Minister of the Interior.

INSTRUCTIONS AS TO THE DESTRUCTION OF RATS AND MICE IN LAZARETS AND SHIPS IN RELATION TO PLAGUE.

Rats and mice are very active agents in the propagation of plague. When they become affected, the disease rapidly spreads amongst the population of the places through which they travel or where they stay. The epizootic in these rodents precedes the human epidemic by a few days. Hence it is desirable at any price to exclude them from lazarets* and ships.

LAZARETS.—It is most important to prevent rats and mice from penetrating into the structure of hospitals in any part. The greatest care must be taken to destroy all that have gained access. For this purpose all openings by which rats or mice can penetrate the structure should, wherever practicable, be closed, or otherwise be furnished with protective appliances, such as brushes, tubes, or, better, with metal screens. The hospitals should, moreover, be

* *I.e.*, floating hospitals.

provided with a sufficiency of such appliances to fix on all cables and moorings between the vessel and the land.

When there are rats or mice in hospitals, they should be trapped or poisoned, and their dead bodies should be immediately burned. If the rats or mice have secreted themselves in places difficult to reach, an asphyxiating gas, such as sulphurous acid (40 grains of sulphur to the cubic metre), should be used. The parts on which dead rats or mice have been laid should be washed with disinfecting solutions.

VESSELS—1. *At the Quay.*—When a vessel is at the quay the mooring-cables, etc., should be protected so as to prevent rats getting in or out of the ship by these means. Foot-bridges should be raised during the night.

Before lading, the absence of rats on board must be put beyond doubt. If there be any, or if their presence be suspected, measures such as those previously indicated must be taken for their destruction. Before lading it is important that the ship should be disinfected with sulphurous acid in all parts likely to harbour rats; other parts should be disinfected with a saline sublimate solution consisting of 1 gramme of perchloride of mercury and 2 grammes of sea-salt to a litre of distilled water. Dead rats should be burned.

2. *At Sea.*—On the voyage every available means must be taken to destroy any rats which may have got on board in spite of precautions taken at the quay. Measures securing their destruction without putrefaction or the disengagement of offensive smells are to be preferred. This result may be secured by the use of certain preparations, such as "*Mort-aux-rats*," which deserves a trial. The bodies of dead rats must be burnt, and the places where they are found should be disinfected.

3. *On arrival in Port.*—On boarding a ship for examination, the medical officer of health must carefully ascertain whether there are any rats on board. If the dead bodies of any be still on the ship, a bacteriological examination of these must at once be made for the purpose of finding the plague bacillus. If the bacillus be found, the ship must be discharged, the cargo and passengers' and crew's baggage disinfected, the vessel fumigated throughout with sulphurous acid, and the dead rats carefully burned. Otherwise the ship is to have free pratique after the completion of the regulation measures of disinfection.

After unloading at ports of discharge, ships are to be disinfected with sulphurous acid wherever this process is applicable, and elsewhere washed with a disinfectant solution.

The sanitary restrictions to be imposed on vessels will depend on the perfect execution of the foregoing instructions. The more thorough and the more promptly certain the destruction of the rats, the less need will there be to enforce them.

It is understood that special measures are actually in force to destroy rats in all the public buildings, and notably in the sewers of Paris. Attention to the dwelling cannot be too carefully bestowed.

ACTION OF A HARD WATER ON CERTAIN METALS (J. L. Howe and J. L. Morrison).—The water examined was found to corrode brass fittings; it contained per 100,000 parts: lime, 7.30; magnesia, 4.065; carbon dioxide, 30.196; sulphuric trioxide, 0.2127 part; chlorine, a trace. Strips of brass, zinc, copper, iron, lead, and aluminium were immersed in the water during four months, with and without access of air, and duplicate tests were made with distilled water. The results of the subsequent examination of the metal and water lead to the conclusion that waters of the above class, free from chlorine, attack zinc more readily than distilled water does, and dissolve out this metal from brass; they should, therefore, not be conveyed through zinc-lined iron pipes. The hardness of the water does not prevent it dissolving lead, the action being more than half as great as that of distilled water when protected from the air. When air is excluded, the action on iron is relatively slight, and this water has no influence on aluminium or nickel (*Journal American Chemical Society*).

HOUSING OF THE WORKING CLASSES.—On October 27th last the Corporation of Bradford adopted the following recommendations of the Sanitary Committee: "(1) That, subject to the approval of the General Committee, the Council be recommended in regard to the medical officer's representation under Part 1 of the Housing of the Working Classes Act, 1890, relating to property in the Longlands Street district, to acquire the whole of the properties referred to in such representation, with a view to an improvement scheme being formulated, and that accommodation be provided on such land for ninety-three through houses, and that other accommodation for persons displaced be provided by means of small through houses in other portions of the city. (2) That the Council be further recommended to adopt Part 3 of the Housing of the Working Classes Act, 1890." The Chairman of the Sanitary Committee, in moving the adoption of the resolutions, mentioned that the density of the population of the area was 301 persons per acre as compared with 21.6 for the whole city. The death-rates from all causes in the area were 45.6, 42.7, 41.2 and 50.8 per 1,000 in 1895, 1896, 1897 and 1898, as compared with rates of 19.8, 16.7, 17.9 and 17.5 in the whole city. Further particulars of the area will be found in Dr. Evans' paper, "The Housing of the Working Classes," published in this Journal in April last.*

* *Loc. cit.*, xi., p. 481.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

Metropolitan Branch.—A meeting of this Branch was held at No. 197, High Holborn, W.C., on Friday, December 8th, 1899. Present, Dr. Dixon (President), in the Chair, Dr. F. J. Allan, J. F. J. Sykes, R. Dudfield, E. C. Yarrow, J. C. Jackson, S. Davies, J. E. Beggs, and Oliver Field.

The minutes of the last meeting of the Branch were read, approved, and signed by the President.

Dr. SYKES read a paper on "Separate Dwellings."*

On the motion of Dr. R. DUDFIELD, the discussion of Dr. Sykes' paper was postponed until the next meeting.

North-Western Branch.—The ordinary monthly meeting of this Branch was held at the rooms of the Chemical Club, Manchester, on Friday, November 10th.

The following Members were present: Drs. Sergeant (in the Chair), Berry, Garstang, Graham, Haworth, Hanson Smith, Wheatley, and Meredith Young.

The minutes of the last monthly meeting were read and confirmed.

Letters were read from the President, Dr. Porter, and Dr. Peck.

Dr. BERRY, Medical Officer of Health of Wigan, then introduced a discussion on "Tuberculous Meat: Uniformity as to Seizure."†

West of England and South Wales Branch.—The annual meeting of the Branch was held at Bath on November 23rd. Under the guidance of the City Architect (Major Davies) the members visited the Roman remains, which were fully described to them. Subsequently an inspection of the baths of Bath was made under the guidance of Mr. T. R. Collins, A.P.S., Manager of the Hot Mineral Baths and Pump-room. A business meeting was held after lunch. There were present: Drs. Crossman, Drake, Harper, Howard Jones, Heaven, Stevens, Tubb-Thomas, Mulville Thompson, Wallace, and Symons. Letters regretting their inability to be present were read from Drs. W. Williams, Bond, Prichard, Kerswell, Coates, Hancocke Wathen, Neale, Harper (Barnstaple), Walford, Randall, D. S. Davies, Herbert Jones, and from Messrs. Stoddart, Wise, and Cotterell.

The minutes of the last annual meeting were read and confirmed.

The reports of the Secretary and Treasurer were next presented. On the consideration of the former, the following resolution was proposed by Dr. TUBB-THOMAS, seconded by Dr. CROSSMAN, and carried, viz., "That in the opinion of this Branch notice of any resignation of a Branch Member received by the General Secretary should be immediately notified to the Branch Secretary, so that an effort may be made to prevent the loss of membership."

From the Treasurer's report it appeared that the expenses of the

* Will be published in our next.

† See p. 280 of this issue.

Branch for the year had been £2 19s., that £14 10s. was received from the parent Society for the year 1899-1900, and that the balance in hand at the commencement of that year was £58 4s. 4½d. After some discussion it was resolved "That £40 of the balance of the Branch funds be deposited in the Post Office Savings Bank in the names of Drs. Heaven and D. S. Davies."

The following Fellows were elected to form the Branch Council for the ensuing year: Dr. W. Williams, County M.O.H. Glamorgan; Dr. Walford, Cardiff; Dr. D. S. Davies, Bristol; Dr. Tubb-Thomas, County M.O.H. Wiltshire; and Dr. Bond, Gloucester.

Dr. John C. Heaven was duly re-elected Hon. Secretary and Treasurer for the year 1899-1900.

Dr. SYMONS then read his Presidential address, entitled, "Local Statistics."* A short discussion ensued.

After a unanimous vote of thanks to the President for his address and hospitality, the meeting adjourned.

Home Counties Branch.—A meeting of this Branch was held at the Holborn Restaurant on Thursday, December 14th. There were present: Drs. Tew (President), in the Chair, Thresh, J. J. Clarke, A. C. Waters, Foulerton, Sanders, Ashby, and Shadwell.

The minutes of the last meeting were read and confirmed. Letters were read expressing regret at inability to be present from Drs. Argles, Seaton, Skinner, and Woodforde. The Hon. Secretary reported that as the result of letters addressed by him thirteen Fellows and Members had joined the Branch, bringing up the membership to sixty-four.

Dr. TEW delivered his Presidential Address, the subject being "Working-Class Dwellings."*

In the discussion which followed Drs. Thresh, Waters, Clarke, and Sanders took part.

A vote of thanks for his able and instructive address was proposed by Dr. THRESH, and seconded by Dr. CLARKE, and carried unanimously.

Scottish Branch.—A meeting of this Branch was held in the Station Hotel, Perth, on Saturday, November 25th.

There were present: Professor Matthew Hay (President), Drs. Campbell-Munro (Vice-President), Leslie Mackenzie, J. T. Wilson, Graham, McDonald, Nasmyth, Chalmers, McVail, Robertson, and Templeman (Secretary).

Dr. Campbell-Munro, and subsequently Professor Matthew Hay, occupied the Chair.

Apologies were intimated from Drs. Bruce, Ross, McNeill, and Sutherland.

Dr. LESLIE MACKENZIE opened a discussion on "Methods of Disinfection,"* with special reference to the necessity of disinfecting walls, floors, and furniture of rooms where infectious disease has existed, and also to the place of sulphurous acid as a disinfectant.

In the discussion which followed, the Members present described the modes of disinfection carried out in their respective districts. The general opinion was that sulphurous acid was altogether untrustworthy as a germicide, and this notwithstanding the fact that, when patients had been removed to hospital, secondary cases of infectious disease,

* Will be published in a future issue.

unaccounted for by direct personal infection, were comparatively rare, even when the only process of disinfection had been "fumigation" with sulphur.

A discussion followed on Dr. J. T. Wilson's paper on "The Census of 1901" (see PUBLIC HEALTH, vol. xi., p. 761, September, 1899).

Dr. WILSON supplemented this paper by a few observations dealing with the census under the following heads: (1) The particulars of information scheduled and collected, (2) the information contained in the printed Abstracts laid before Parliament, (3) the time allowed to prepare the Abstracts, and (4) the local supervision exercised in the preparation of the Census. Under the second head Dr. Wilson suggested that an enumeration of the population with the number of families and houses occupied should be given, not only for parishes, but for public health special districts—that is to say, districts defined for any of the following purposes, viz., water, drainage, lighting, or scavenging—and he thought, as maps showing the boundaries of such areas are readily available, there would be no difficulty in the enumeration.

After a free expression of opinion by the Members, it was remitted to the Council to formulate the views expressed, and lay them before the Local Government Board for Scotland.

Dr. A. K. CHALMERS read a paper on "Some Points in Dairy Construction"* suggested by the Dairies, Cowsheds, and Milkshops Order (1899).

Owing to the lateness of the hour, the discussion was postponed to the next meeting in February.

MEETINGS FOR JANUARY.

January 4th, Birmingham and Midland Branch, at Birmingham.

January 12th, Incorporated Society, at 197, High Holborn, W.C.

North-Western Branch at Liverpool.

SANITARY ADVISER TO H.M. OFFICE OF WORKS.—We note with much pleasure that Professor Corfield, a past-President of our Society, has been appointed Consulting Sanitary Adviser to Her Majesty's Office of Works for the Royal Palaces and Public Buildings in charge of that Department of the Government. The appointment emphasises from an official standpoint the importance of the sanitation of buildings, a part of public health which medical officers of health cannot afford to neglect, which view is clearly accepted by Her Majesty's Office of Works. The more every branch of sanitation is imbued with the medical spirit, and backed up by medical knowledge, the more thorough and complete will be the progress of public health. Hence we welcome Professor Corfield's appointment just as we welcomed Dr. Whitelegge's appointment as Chief Factory Inspector. Before many years are past it is likely, we think, that many sanitary inspectors will be qualified medical men and women, and that from among those who have held such positions medical officers of health will be chiefly, and eventually entirely, recruited.

* Will be published in a future issue.

DIPHTHERIA AT FORT KENT, MAINE, U.S.A.*

By WELLINGTON JOHNSON, M.D.

On the afternoon of October 9th, 1897, I was asked by Dr. A. G. Young, Secretary of the State Board of Health, to go to Fort Kent to see what could be done to stamp out an epidemic of diphtheria which had grown from a few cases to so alarming an extent that more than a hundred individuals had suffered from the dread disease, and there had already been twenty-five deaths. Unfortunately, the local board of health had lost control of the epidemic, and a few days previously had sent to the State Board for assistance.

According to arrangements, I started on the 2 a.m. train Monday morning, and arrived at Caribou at 2.30 p.m., where I took a team for a drive of forty-two miles, which was covered that night. Thus I arrived at Fort Kent 10 p.m. of the same day I left home. Word had reached there that relief was to be sent from Augusta, and your correspondent received a hearty welcome from all except the hotel proprietor, who was afraid to have him in the house after he had been visiting diphtheria cases all day.

After a night's rest, working under Dr. Young's instructions, I started out early in the morning to learn the true status of what had to be done to get full control of the epidemic. The local board, together with the chairman of the board of select men and the Catholic priest, Father F. X. Burque, were all disposed to render all the assistance they could in bringing about a speedy relief from the spread of the now dreaded disease.

Word had gone forth to the outside world of the present state of affairs at the fort, so that business was being paralyzed, travelling men not daring to come into the town, so much so that stringent measures must be undertaken to change matters for the better protection of all concerned.

Upon inquiry I found that the health officer, Dr. Sirois, had been trying to manage the whole affair alone, but was fast losing ground, as the disease was spreading to other localities, being carried from place to place by those who were not disposed to obey quarantine laws and regulations, and thus crippling the local board in its efforts to stamp out the disease. Active measures were taken, and the arrest of one renegade had a salutary effect on the would-be travellers who had been exposed to the disease. Dr. Sirois not being able to care for all the sick, Dr. J. F. Archambault was invited to take part in the warfare against the Klebs-Löffler bacillus. Accordingly, on Tuesday morning, October 12th, the above-named physician, with I. B. Bourgoin, member of the board of health, and myself, started on a raid armed with antitoxin and antitoxin syringes. Our first day's campaign was rewarded by finding thirty cases of diphtheria, and antitoxin was administered to all without any serious objection on their part.

The next day found the same party on a similar errand, and this was continued until we made the rounds, and seventy-five or eighty cases were treated. Strange to say, out of the first seventy cases in that vicinity there were twenty-five deaths, while in the last seventy-five cases treated by antitoxin only one died that received the treatment,

* We publish this as an example of democratic thoroughness.—Ed. P. H.

and that was a child of twelve years, who had been sick ten days—a glorious record for the new method of treating the disease with antitoxin.

As to details of treatment: As soon as a case was found we immediately gave from 500 to 1,500 units injected into the deep tissues of the abdomen, the dose varying according to the age of the patient and the severity of the disease. In twenty-four or thirty-six hours the throat would clear up, temperature and pulse would become normal, and the patient would be on the road to recovery. We also used boric acid solutions for gargle, and tincture of muriate of iron and quinine internally. As soon as all the members of the family became convalescent, a thorough disinfection was done with Professor Robinson's formaldehyde generator, and the steam arrangement for clothing, pillows, etc.

Results.—In two weeks' time there were only two cases in the several towns and plantations, and these convalescent. So much for active, persistent, and thorough work with the proper implements to fight the diphtheria germ. The serums used were Messrs. Parke, Davis and Co.'s, and Pasteur's.

In addition to the medical treatment and the disinfection, local boards were organized in the plantations of New Canada, Wallagrass, and the town of Frenchville, and instructed how to proceed in the prevention and cure of contagious diseases, especially diphtheria. Taking all in all, a busy two weeks' work was accomplished by the representative who was sent there by Dr. Young under the auspices of the State Board of Health, for he met and held meetings with the local boards nearly every evening. Great praise is given the State Board by the local boards and citizens, for the ready response the State Board made in the hour of need.

Augusta, October 30th, 1897.

ANALYTICAL NOTES.

PRESERVED BREAD.—Henry A. Sevigne, of Boston, U.S.A., has taken out a patent for a method of preserving bread. The process, according to the *North-Western Miller*, is to heat the bread in an oven to a high temperature, and allow it to cool, until it is at a temperature of 90° F. Each loaf is placed in an airtight and waterproof wrapper before the temperature of the bread has fallen to the temperature of the surrounding atmosphere. The edges of the wrapper are closed and secured upon the loaf, thus enclosing the bread in a flexible, sealed, airtight, and waterproof wrapper, which is sufficiently transparent to enable its contents to be visible.

DETERMINATION OF FAT IN CONDENSED MILK.—The following method has been devised by A. E. Leach for the determination of fat in condensed milk: Weigh out 40 grms. of the sample, and make up 100 c.c.; withdraw by means of a pipette 15 c.c. of the solution, corresponding to 6 grms. of the sample, and transfer to a 50 c.c. test-bottle, graduated to read to 0.1 per cent.; then pour in water till the liquid nearly reaches the neck of the bottle, and add 3.5 c.c. of an aqueous solution of copper sulphate of the strength of 69.28 c.c. per litre (Fehling's copper solution). Shake the bottle well, and allow the contents to

settle. The precipitate, which consists of proteids with the fat, subsides more quickly if the bottle is cooled in iced water. Draw off the clear supernatant liquid, which contains the sugar in solution, by means of a small-stemmed pipette of a capacity of 50 c.c., the upper end of which is fitted for convenience with a piece of rubber tubing. Twist lightly about the lower end of the pipette a small wisp of absorbent cotton to serve as a filter. After the liquid is drawn up into the pipette, remove the cotton wad from its lower end by lightly rubbing it against the inside of the neck of the bottle as the pipette is withdrawn. Wash the precipitate three times by decantation, and then add 25 c.c. of sulphuric acid, the usual centrifugal method being followed. The reading to tenths, multiplied by six, gives the percentage of fat in sample. The foregoing method is employed in the laboratory of the State Board of Health, Massachusetts (*British Food Journal*, i., 236).

REVIEWS.

FINAL REPORT OF THE DEPARTMENTAL COMMITTEE APPOINTED TO INQUIRE INTO AND REPORT UPON CERTAIN MISCELLANEOUS DANGEROUS TRADES. London: For H. M. Stationery Office, Eyre and Spottiswoode, 1899. Price 5d.

This (the fourth) report marks the conclusion of the four years' labour of the Committee, during which they have inquired into the peculiar details of no less than twenty-six dangerous industries. Considerable difficulty has been found in correctly referring to each trade the deaths which arose directly or indirectly from following it, and the Committee go so far as to suggest that deaths of those engaged in trades for which special rules have been established should be referred to the coroner if death takes place within three months of their following such employment.

The trades reported upon in this portion of the report include the manufacture of grindstones, the use of emery wheels, basic slag works, the manufacture of silicate of cotton, salt works, and flour mills, the use of metallochrome powder in lithography, of lead in printing and dyeing, of arseniate of soda in dyeing, and the licking of labels for reels in thread mills. Most of these trades are of very limited extent, and though the account given is extremely interesting, it has but little bearing on health as against danger.

With the precautions to be taken against the fracture of revolving emery wheels, or the fencing of pans full of scalding brine, we have but little to do. It is more to the point to learn that in the preparation of grindstones from "Buhrstone" a fibroid condition of lung is induced, which materially shortens the life of workers, and that the fine dust of basic slag, so fine as to be almost impalpable, is the cause of acute pneumonia, and was at first suspected to be the cause of the great Middlesbrough epidemic of 1888.

With regard to flour mills, the Committee think that sufficient power is not given to the inspector to insist upon fans in all dusty trades, and while they cannot actually prove the dangerous character of flour, regard it as under suspicion.

"Metallochrome" appears to be the name given to a large number of white powders, some of which contain lead and arsenic, while others

are composed only of barium sulphate. The special recommendations of the Committee apply to those powders which contain 5 per cent. of lead and over.

The use of lead salts for the production of yellow or orange colour in dyeing and calico-printing has been found to produce plumbism in a marked degree, and special rules are proposed, it being the avowed intention of the Committee to replace the lead salts by aniline dyes, which do not command so good a sale or price. The use of arseniate of soda in dyeing does not appear to be attended with special risks to the workers.

The licking of labels of all sorts, including postage stamps, is a disgusting rather than an unhealthy process, and with that it may be dismissed.

To those interested in special trade processes, the four reports will be found full of most entertaining matter, and they constitute a valuable addition to the history of disease arising from special occupations.

THE WATER SUPPLIES OF DERBYSHIRE. By Sidney Barwise, M.D., County Medical Officer of Health, and John Soames Story, M.Inst. C.E., County Surveyor. Derby and London: Bemrose and Sons, Limited. Price 1s. 3d., post free.

This is a Report to the Public Health Committee of the Derbyshire County Council by their Medical Officer and Surveyor, and would appear to well-nigh exhaust the subject of the water supply of the County of Derby from within the county boundary. The efforts of the County Council and of the Corporation of Derby to secure water from the Merebrook Sough, a source eventually abandoned in consequence of its liability to pollution, and the similar and no less futile efforts of small local authorities, led to Professor Boyd-Dawkins being consulted, who reported against "isolated efforts of small and comparatively poor local authorities" being made, and recommended joint action to acquire the watershed of the River Derwent. In consequence of this advice, the authors were instructed to report as to the available sources of water within the County of Derby. By co-operation with the Corporation of Derby, the County Council has achieved a splendid success in securing the adoption by Parliament, in the first Session of 1899, of the Derwent Valley Water Scheme. That scheme has secured waters of the Upper Derwent Valley to the Corporations of D Leicestershire, Nottingham, and Sheffield, the County Council of Derbyshire, and, for a limited period—until 1930—to the County Council of Nottinghamshire.

The rainfall and watersheds of the County of Derby and immediately surrounding neighbourhood are given in tabular form in connection with the rainfall tables a plan of the County in the form of showing the physical configuration of the land, which in this it is that the rainfall increases with the elevation of the ground, and the primary watersheds of the county—the Mersey, the Trent, and the Ouse—are divided into their various tributaries, and the loss of tabulated. The various ridge lines to the watersheds, the most prominent altitudes in relation to mean annual rainfall, and from which it is shown that the Mersey watershed caused a practical one gravitation scheme with those of the Trent and manufacturers of

A description of the chief gathering grounds in preparations waters in the county is also given, in connection with which a plan has been prepared, showing clearly their

1888
112

total and available rainfalls, and gross daily yield of each gathering ground have been calculated, and analyses made of the various waters. The authors have endeavoured to make their report intelligible to the members of their Council by giving a concise explanation of the chemical terms used in connection with these analyses. It cannot be expected that the average county councillor will readily, if at all, grasp the meaning of *free and albuminoid ammonia*, *nitrogen as nitrates and nitrites*, etc., and the authors' explanations cannot fail to be appreciated. The merits of each of these gathering grounds are set forth, and the action of the acids so common in moorland waters on lead service pipes has not escaped notice.

Probable supplies from underground sources by means of deep wells is the subject of another section of the report, and is certainly not the least important. Where abundant water of the necessary quality can be obtained from these sources within reasonable distance of the district to be supplied, they should not be passed by. The geological formation of these underground gathering grounds is exhaustively treated, and again analyses of their waters are given. Limestone water is objected to on account of its liability to pollution. The authors are of opinion that no purification is effected except by subsidence, as the passage of the water through the rock is mechanical. The analyses of these waters do not, however, necessarily point to serious pollution.

The mill-stone grit receives favourable notice as bearing water of good quality, but its area in the County of Derby would appear to be somewhat too limited to be of much use in providing large quantities.

Waters from the Derbyshire coal measures are dismissed as quite hopeless, the quantity being not only scanty, but also highly mineralized. A striking feature of the analyses is the great variation in the quality.

The Bunter sandstone, like the mill-stone grit, yields excellent water, but the quantity is somewhat limited in consequence of the smallness of the area of this formation which outcrops.

The new red marl and alluvial deposits yield even worse water than the Derbyshire coal measures.

For the purposes of the underground sources of the report, the geological map of the county is reproduced.

Section 5 describes the sources of the local supplies of the district councils. Each urban and rural district is dealt with separately, and the analyses of the water are detailed, showing that a large number of wells are polluted with organic matter of animal origin. We trust that the efficient means of filtration is resorted to before the water reaches the consumer. Water containing 139 parts per 100,000 of little beads, with free ammonia well in the first place of decimals, and the ammonia almost as bad, to say nothing of other impurities, must be a constant anxiety to the sanitary authorities.

little to do with wells and boreholes are given, the most interesting being the one at Little Hallam in the Erewash Valley for the grinding of millstones. This bore reaches a depth of over 1,800 feet, and basic slag, salt water entered during the sinking of the well. pneumonia, of the report, together with another plan of the county, Middlesbrough planning—so far as it relates to the Derbyshire County Council.

With regard to the Water Act previously referred to. The scheme may be realized when it is remembered that while they can nearly £7,000,000. Six impounding reservoirs, regard it as under nearly 10,000 million gallons, are to be constructed.

"Metallochromy." Five of these will store 7,501 million gallons of white powders,

for consumption, and the sixth, holding 2,495 million gallons, is to supply compensation water to the river. The whole of the drinking water is to be filtered, and will then be conducted in a south-easterly direction across the county of Derby and into Nottinghamshire and Leicestershire. The scheme is estimated to yield 33 million gallons per day for drinking purposes, and if this estimate proves correct, will be divided amongst the authorities as under:

Derbyshire County Council (first water) ..	5 million gallons per day.
Derby Corporation ..	7 " "
Leicester Corporation ..	10 " "
Nottingham Corporation ..	4 " "
Sheffield Corporation ..	7 " "
	33 " "

This arrangement is unique inasmuch as it allocates by Act of Parliament water to an administrative county, and further secures to that authority a prior right over the other authorities to 5 million gallons per day, no matter whether the ultimate yield proves to be as estimated or not. The authors claim a still further advantage in the fact that one of the county districts are to provide any of the capital for the same. The rate to be paid for the water supplied to them is to be calculated upon a sum which bears the same relation to the total expenditure upon the works as the quantity of water demanded by the county bears to the total quantity of water yielded by the works; so that if the estimates prove correct, for every £1,000,000 expended, that same amount will be provided, and the cost to the county districts reaches 4½d. per 1,000 gallons. If, however, the total cost are exceeded, the county districts, being under no obligation to make any water, run no risk. But equally important from the point of view are the clauses in the Act which empower the county Council to form joint water districts, which perhaps, being able to demand water upon the same terms as sanitary supply of like sections of the Act giving these powers are quoted as useless, as s.

The last part of this report which make it of considerable interest to local authorities, and the authors are to be commended for collating a mass of most useful information. The estimated cost of the works, containing together in the Derwent Valley

LIME DISINFECTANTS.

Lime has until recently been the only form of disinfectant for use in an aqueous solution containing 5 per cent strength sedimentation is slow, and the insoluble lime salts) results in the loss of upwards of one-third of the liquor. This fact and the pungent odour of the powder probably account for the facility with which less reliable preparations of carbolic acid, etc., have obtained a practical monopoly. The United Alkali Company, the largest manufacturers of chlorine in the world, have, however, brought out certain preparations—viz., "Chloros" and "Sanitary Chloride of Lime"—which promise to rehabilitate disinfection by chlorine.

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The evidence in favour of the value of chlorine is very strong. Passing by Koch's work on the subject (his results will be found in Günther's *Bakteriologie*), we may mention Bokorny's determinations* of the relative values of mercuric chloride, potassium permanganate, carbolic acid, chlorine, etc. He bracketed chlorine with mercuric chloride, both being effective in dilutions of 0.01 per cent., while chlorine proved fatal to certain organisms with dilutions as high as 0.001 per cent. Delépine, at the Leeds Meeting of the Sanitary Institute, stated that 1 in 100 solutions of chloride of lime—i.e., containing 0.35 per cent. of available chlorine—were fatal, "in a few minutes," to the spores of *Bacillus anthracis*, which statement was endorsed by Simms Woodhead. Klein† has reported that solutions of hypochlorite of soda containing 0.35 per cent. of available chlorine will kill the *B. proteus vulgaris*, *B. coli*, *B. typhosus*, *B. diphtherie*, the vibrio of Asiatic cholera, and *Staphylococcus pyogenes aureus* in five minutes, whilst a solution containing 0.1 per cent. of available chlorine completely sterilized the sewage of St. Bartholomew's Hospital in ten minutes. Similar results had been previously obtained by Clayton.‡

"Chloros," a solution of sodium hypochlorite, contains 10 per cent. of available chlorine, equal to 120 grammes per litre. Its efficiency can be measured by the amount of chlorine available in any of its dilutions, whilst its concentration renders it suitable for distribution to the public for subsequent use in such dilutions. It does not readily undergo decomposition, and its price is such as to allow of a free distribution without incurring excessive expenditure. It is suitable for any of the purposes to which the disinfectants now on the market are used.

"Sanitary Chloride of Lime" contains either 10 or 15 per cent. of available chlorine, instead of 35 per cent. contained in the commercial preparation. The lower strengths are advantageous in that the powder does not tend to form a pasty mass, as does the commercial, which renders it unfit for sprinkling and dusting. A standard composition of 10 or 15 per cent. is preferable to a variable one, which may be 35 or lower, as the preparation can be used with more confidence. We need not refer to advantages which a preparation of known composition enjoys over those whose composition is concealed.

We have on more than one occasion already commended these preparations, and we feel sure that the sanitary service will appreciate them and find them generally useful.

CORRESPONDENCE.

"SEWER VENTILATION AND SEWER SMELLS."

TO THE EDITOR OF "PUBLIC HEALTH."

SIR,

Would you kindly give me space to call attention to the "summary of replies" on this subject received by the Vestry of Kensington, and published as a supplement with *PUBLIC HEALTH* for October.

It will be noticed that the twenty-eight tabulated replies referring

* *Zeit. für Ang. Chem.*, June, 1897.

† *Lancet*, November 28, 1896.

‡ *Journ. Soc. Chem. Ind.*, 1895.

to question No. 10, "Is the system regarded as satisfactory by the authority?" analyze as follows:

- 15 are significantly silent.
- 2 say "Not quite."
- 5 say "Yes," with qualifications.
- 6 say "Yes."

From other sources of information, however, it would appear that the six "yes" must be taken with some reserve; that they rather represent optimistic approximations, and were not intended to be taken in an absolute sense.

Nothing, therefore, could well be more condemnatory of the present methods of sewer ventilation than this authoritative "summary," and it may be hoped that its publication will prove a public service of the greatest utility, inasmuch as a clear view of an erroneous method is the first step to its correction.

Nor is the value of the report confined to the negative information contained in the tabulated replies; the positive information appended thereto is even of greater value—all the greater for the preceding negative information. But the full importance of this further information may be missed without some knowledge of the facts. Indeed, without such knowledge, it may in some cases even prove misleading.

To properly understand the reference to Edinburgh the following should be kept in view: The forty-four apparatus are in use on the main outfall sewer (9' 3" x 7' 2"). This sewer drains a large district of Edinburgh, as also certain villages for seven miles above Edinburgh. It is well built and graded, and delivers the sewage with a rapid flow, preventing any deposit. It receives discharges from distilleries, breweries, paper-mills, chemical and other works. The surface gratings had all to be closed securely owing to the offensive emanations which came through them. The sewer was now without a means of ventilation, and immediately an outcry was raised against the influx of sewer-gas into the houses under certain atmospheric conditions. Ultimately Mr. Cooper, the Edinburgh engineer, decided to make experiments at three manholes with the Reeves system; apparatus were set to work, and the grating in each re-opened. Finding there were now no complaints where formerly the grating could not be left open without complaints, Mr. Cooper advised his authority to apply the system on a much larger scale. The installation at Edinburgh consists at present of fifty-three apparatus, the forty-four already referred to having been running continuously since February last. During this time the reopened gratings have been entirely free from smell, and although no district statistics have yet been drawn out to determine the effects of the Reeves system upon epidemics, that these have disappeared largely from the district affected is certain, and the minutes of the Edinburgh authority as published in the Edinburgh newspapers refer to the system as a success and a public benefit.

Without a knowledge of the foregoing the figures giving the cost of the system would not be understood, and with regard to these I think that £5 as the price of "water" is probably a misprint for £3; and as to the charge for "attention," it should be explained that the Edinburgh authorities have told off two men for this service alone, and that the same men could attend to a very greatly increased number of apparatus, while in most cases there would be no extra required on this head.

The following notes will serve to give an idea of the work done by the system at Edinburgh: First, some of the apparatus are each doing effective ventilation of the equivalent of twelve miles of a twelve-inch pipe sewer running quarter full-bore, and second, as the result of fifteen careful measurements, it has been found that an average of 700 cubic feet of air per minute passed out by each of the gratings in which fifteen apparatus respectively were in use.

With regard to Fulham it need only be added that the apparatus are doing special work there also, one of them being fixed in a manhole close to the discharges from a large brewery, and that the cost given for maintenance is not to be taken as any guide to the cost of the system when applied as a system.

Yours, etc.,

WILLIAM BROWN.

17, Victoria Street, Westminster, S.W.,
October 26th, 1899.

APPOINTMENTS.

Campbell, D., M.D., reappointed M.O.H. of Calne U. and R.D.C.
Jones, T. O., L.R.C.P., reappointed M.O.H. of Ruthin U.D.C.
Joynes, F. J., M.R.C.S., reappointed M.O.H. of Dursley (Glos.) R.D.C.
Molineux, J., M.D., appointed M.O.H. of Hessle U.D.C.
Perrott, C. J., L.R.C.P., reappointed M.O.H. of Kingswood U.D.C.
Rouse, R. D., L.R.C.P., appointed M.O.H. of Madron U.D.C.
Simpson, G. A., M.R.C.S., reappointed M.O.H. of Acton U.D.C.
Southey, A. J., M.R.C.S., reappointed M.O.H., of Eton R.D.C.

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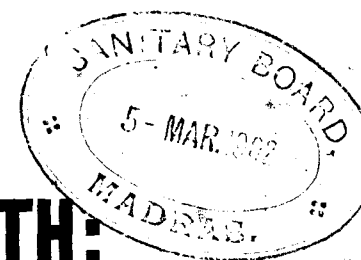
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PUBLIC HEALTH:

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Medical Officers of Health.

VOL. XII. No. 5.

FEBRUARY, 1900.

EDITORIALS.

VOLUNTARY NOTIFICATION OF PHTHISIS.

WE would call special attention to the important communication received from the Local Government Board dealing with this subject, which will be found in the Report of the Council submitted at the last meeting of the Society.* Some doubt was felt as to whether the district auditors would surcharge the members of any authority who had made payments for the notification of cases of phthisis, and the Local Government Board was asked as to the course the auditors would be likely to take.

It appears that the district auditor can only allow to pass such charges to make which legal power exists, and it is therefore important to observe "that, in the Board's opinion, local authorities have power under the provisions of the Public Health Act, 1875, to make reasonable payments in respect of the notification of cases of infectious disease occurring in their districts." Before the passing of the various Acts requiring compulsory notification of infectious disease, certain authorities had adopted voluntary notification of smallpox and fevers under the provisions of that Act, with the sanction of the Local Government Board. In giving their consent to the voluntary notification of phthisis, the Board are therefore following their established precedent, and thus giving an opportunity to test the value of notification in regard to this disease. We take it, then, that if any medical officer of health advises his authority that it is in the interests of the public health of his district that fees should be paid for the voluntary notification of phthisis, the local authority has the power to act on such advice, and the Local Government Board will sanction it, provided the fees proposed to be paid be reasonable.

It is also desirable to keep in mind that Poor Law medical officers

* See p. 366 of present issue.

are still required to give information to the medical officers of health of their respective districts as to cases of sickness occurring among pauper patients. Since the Notification Acts came into force there has been a tendency to neglect this source of information, which is specially valuable in the case of phthisis, as it is among the poorer classes that the disease chiefly prevails.

REGULATIONS FOR HEALTH OFFICIALS IN SCOTLAND.

THE Local Government Board of Scotland, unlike that of England, is a tangible body, and although it has not been long in existence, it has laid down for itself certain well-defined principles to guide its course of action, due doubtless to the experience of the men who form it. Some difficulty has cropped up in getting certain of the local authorities into line with respect to the byelaws which have to be drawn up under the Public Health (Scotland) Act.

A byelaw is a regulation which may be varied to suit the requirements of any district, but it is only in the method of applying it, and not as regards the principle embodied, that any alteration can be sanctioned by the central authority. Some local authorities fail to appreciate this distinction, and thus friction has arisen. A case in point is that of the Local Authority of the Burgh of Dumfries, who desire that no case of infectious disease shall be sent to hospital at the public expense without the sanction of the burgh sanitary inspector, that officer to be the judge as to whether a patient is or is not sufficiently isolated. As an alternative the Council of the burgh suggest that where the medical officer of health and the sanitary inspector disagree as to the sufficiency of isolation, a committee should intervene. The Council do not seem to have recognised that notifications of infectious disease are not sent to the Council or to the sanitary inspector, but to the medical officer of health, who alone has the training necessary to decide as to the best means to be taken to prevent the spread of infection, and on whom must rest the responsibility of acting in such cases.

The difficulty in this case, so far as we can gather from the published correspondence, seems to have arisen from the fact that the Local Authority some years ago drew up a schedule enumerating the classes of persons who might be sent into the fever hospital at the public expense. The medical officer of health, apparently finding that a hard and fast line could not be drawn in this matter, in

**See also the letter from the Local Government Board of Scotland at the end of this article.

the exercise of his discretion sent to the hospital a patient—a domestic servant, we believe—whom the Local Authority thought should have been isolated in her employer's house, or sent to her own home. The Local Government Board have very properly pointed out that while it would be bad policy to make any regulation which would cause delay and hesitation in isolating all cases for the sake of checking what the Local Authority deem to be in singular instances an excess of precaution in the public interest, it is their right and their duty to review the actions of the medical officer, to instruct him as these regulations (13 and 21) provide, to report his proceedings with reference to every case removed to hospital by his authority at the expense of the Local Authority, and to state why in the public interest he did so. In this way the Local Authority might speedily establish precedents, and exercise legitimate influence over the medical officer's future judgments."

The matter is not yet decided, but apparently public opinion, as evidenced by the local press, is in favour of the Local Government Board's contention, and a tendency is manifesting itself in the district towards the treatment of all infectious cases in hospital.

REGULATIONS FOR SANITARY OFFICIALS.

Local Government Board, Edinburgh,
September 4th, 1899.

SIR,

The Local Government Board have very carefully considered the contents of your letter of 12th ult. regarding the above matter. The Board regret that the Local Authority have with so much elaboration and trouble entered into the defence of a position which has not been impugned.

In the opinion of the Board the liberty of the Local Authorities and of the Board in regulating the duties of the medical officer and the relations of sanitary officers under Section 15 is not absolute. It cannot interfere with the positive prescription of duties by Statute and the relations which necessarily arise therefrom. Due regard must be paid to the essential qualifications of the sanitary officers in the allocation of their duties where a discretion is allowed. It must also be remembered that while Local Authorities have absolute control even over the statutory powers of the sanitary inspector, under Section 15 ("The medical officer of health may, when authorized by the Local Authority, exercise any of the powers with which the sanitary inspector is invested by this Act"), there is no corresponding authority to dispoise the powers of the medical officer of health.

Subject to these observations, the Board have no wish to interfere with the Local Authority in the control of their sanitary officers, and respect their desire to discharge their obligations under the Public Health Act with due regard to economy. At the same time, the function of the person certifying under Section 54, or in the case of removal by consent, advising, is purely a medical function. It must be

discharged by a medical man. The proposal to give the sanitary inspector any discretion in ulterior steps is inadmissible.

No doubt the Local Authority have such a discretion, but it is one which obviously in its exercise involves issues of much greater gravity if it leads to a decision opposed to, than if it acts upon, medical opinion.

The Board observe the statement that "the medical officer at one time caused difficulty by asserting his right to send cases at his own hand to the hospital, although they did not come under the classes enumerated in the schedule (Section 7)—that is to say, where there was ample accommodation for isolating the patients at their own residences. The Local Authority cannot consent to any regulation which will allow of such a practice entailing a needless expenditure of the ratepayers' money, and a needless friction in carrying out the Act, with no corresponding advantage to the public health."

The Board are unable to share in these apprehensions. They beg to point out that while it would be bad policy to make any regulation which would cause delay and hesitation in isolating all cases for the sake of checking what the Local Authority deem to be in singular instances an excess of precaution in the public interest, it is their right and their duty to review the actions of the medical officer, to instruct him as these regulations (13 and 21) provide, to report his proceedings with reference to every case removed to hospital by his authority at the expense of the Local Authority, and to state why in the public interest he did so. In this way the Local Authority might speedily establish precedents, and exercise legitimate influence over the medical officer's future judgments.

The Board anticipate with some confidence that the Local Authority will now see their way to adopt the text of Regulation 15, as drawn in their letter of October 8th, taking advantage of Regulations 13 and 21 to require the medical officer to report as above suggested.

I am, sir,

Your obedient servant,

G. FALCONAR STEWART, Secretary.

To the Clerk,
Local Authority, Dumfries.

SECURITY OF TENURE.—In writing to the Okehampton Rural District Council on the question of the reappointment of Dr. E. H. Young, the Medical Officer of Health of the District, the Local Government Board stated that they had under consideration generally the question of the tenure of office of medical officers of health, and where, as in the case of Dr. E. H. Young, a medical officer held a diploma in public health they would be prepared to consider favourably an application for sanction to his reappointment without limit of time. The communication added that if the Rural District Council were willing to so appoint Dr. Young they would be willing to sanction the reappointment accordingly. The Council eventually decided to reappoint Dr. Young without limit of time. This marks a new departure on the part of the Local Government Board, and it appears to us that if the Board will take the further and almost consequential step of insisting that all reappointments under such circumstances should be permanent appointments, the question of fixity of tenure would be practically finally settled. Officers would gain permanent appointments after a probationary service.

SEPARATE DWELLINGS.*

By JOHN F. J. SYKES, D.Sc., M.D.,

Medical Officer of Health, St. Pancras, and Lecturer on Public Health,
Guy's Hospital.

THE case of *Seaman v. Lee*,† heard in the Queen's Bench Division on March 23rd, 1899, before Mr. Justice Grantham and Mr. Justice Kennedy, again directs our attention to the housing of the working classes, and especially to the interpretation to be placed upon the words "separate dwellings."

In this case the owner of certain houses claimed exemption from the inhabited house duty under the Customs and Inland Revenue Act, 1890 (53 and 54 Vic., cap. 8), section 26, subsection 2, and the Act of 1891 (54 and 55 Vic., cap. 25), section 4, the former of which enacts that "the assessment to inhabited house duty of any house originally built or adapted by additions or alterations and used for the sole purpose of providing separate dwellings, where the annual value of each dwelling shall not amount to £20, shall be discharged by the Commissioners for executing the Acts relating to the inhabited house duties, provided that a certificate of the medical officer of health for the district in which the house is situate . . . shall be produced to them to the effect that the house is so constructed as to afford suitable accommodation for each of the families or persons inhabiting it, and that due provision is made for their sanitary requirements. . . ."

The medical officer of health certified that the houses were (at the date of his examination) "constructed so as to afford suitable accommodation for each of the families or persons who were represented to me as then inhabiting the said houses respectively, and that due provision was made for their sanitary requirements." There was no definition of what was meant by these words, but there was added in a note: "The above certificate is not to be taken as implying any opinion on the part of the medical officer of health that the houses in question are 'built or adapted by additions or alterations and used for the sole purpose of providing separate dwellings,' his examination having led him to a contrary opinion."

* Read before the Metropolitan Branch of the Incorporated Society of Medical Officers of Health, December, 1899.

† See PUBLIC HEALTH, xi., p. 822 (September, 1899).

‡ For the history of events leading to this enactment, see "Tenemented Buildings and Duties on Inhabited Houses," *Journal of the Sanitary Institute*, part i., vol. xix., 1898.

The construction of the houses is as follows: Each house has a front-door, kept closed as in an ordinary house, but separate bells are provided for the tenants on the first and second floors respectively, and a knocker for the use of the tenant on the ground-floor. Each floor contains a separate sitting-room, bedroom, kitchen, water-closet, and larder, and there is a separate coal cellar for the occupiers of each floor in the yard at the back of the house. The occupier of each floor has the use on specified days of a common scullery or wash-house on the ground-floor and of a common front entrance and hall. The tenants of the upper floors also have common use of the staircase, and all the rooms in each house open direct on to the landing or floor upon which they are situated, and none of the rooms communicate with one another.

The Attorney-General, for the respondent, the Surveyor of Taxes on behalf of the Crown, said it must be remembered that the exemption in the modern Acts was engrafted on the terms of Rule 6 of Schedule B of 48 George III., cap. 55, which provides that "where any house shall be let in different stories, tenements, lodgings, or landings, and shall be inhabited by two or more persons or families, the same shall nevertheless be subject to and shall in like manner be charged to the said duties as if such house or tenement was inhabited by one person or family only, and the landlord or owner shall be deemed the occupier of such dwelling-house, and shall be charged to the said duties." The short point was that a structurally separate dwelling was necessary, as distinguished from separate floors. *The test was the capability of each group of rooms to be shut off from the rest. Here each room—not each set of rooms—communicated with a common staircase.* The intention with which they were erected only becomes important after it has been found that the dwellings are separate in fact. Here the Commissioners found as a fact that the dwellings were not separate.

The Attorney-General could not have put the case more clearly, and the Justices on appeal could not have rejected the contention more decidedly, when they both expressed the opinion that Rule 6, Schedule B, 48 George III., cap. 55, must be set aside, and did not govern the question of assessing to inhabited house duty a house built or adapted and used for providing separate dwellings at rents not exceeding £20 a year if the medical officer of health give a certificate. If the certificate of the medical officer of health be not produced to the Commissioners, then Rule 6 does apply, and the separate dwellings in the house, instead of being assessed separately and escaping house duty or paying a reduced duty, are assessed

together, and full duty is payable on the whole house, unless the dwellings, on account of being situated on a common stair* outside the main building or open to the outer air, and of being each entered separately by one entrance or front-door, are regarded by the Commissioners as separate houses, and assessed separately.

The word "separately" occurs in sections 71 and 72, the Public Health Act, 1875, and in section 96, the Public Health (London) Act, 1891, making it unlawful *to let or occupy separately as a dwelling* any underground room as defined in the sections. This is held to mean separately from that part of the house which is not underground, and subsection 6 of section 96 of the Public Health (London) Act, 1891, also expressly enacts that if two or more underground rooms are occupied together, each of them shall be deemed to be separately occupied, also meaning separately occupied from the rest of the house. This is interesting, as indicating the meaning of separately with regard to the letting or occupation—that is, the usage of that particular part of the house, namely, the basement floor. Subsection 8 of the same section characterizes a dwelling as a sleeping place. It must be observed that as there may be one or more dwellings separately occupied on the basement floor, therefore the "floor" of the house does not constitute the separation; in other words, it is a question of separate usage, and not of separate construction, that constitutes the separation.

Let us examine more closely the words of the Act in accordance with which the medical officer of health has to certify; they are: "That the house is so constructed as to afford suitable accommodation for each of the families or persons inhabiting it, and that due provision is made for their sanitary requirements." This is a question of construction and provision for separate families or persons in the same house, and the duty is cast upon the medical officer of health of deciding what is suitable and due in the construction of a house so used.

Let us also examine more closely the words describing the kind of house to which such a certificate applies—"any house originally built or adapted by additions or alterations and used for the sole purpose of providing separate dwellings" at a certain annual value. Here again we have placed first the construction, and, secondly, the usage in accordance with the construction.

Now, the High Court has decided, as a question of law, that a separate dwelling merely means a dwelling separately occupied; in

* For the economy of space effected by building common stair dwellings, see "Block Dwellings," Section of Architecture, vol. vi., *Transactions of International Congress of Hygiene*, 1891.

other words, that *separate usage* constitutes the separation of dwellings in a house, and therefore that a "house let in separate dwellings" is synonymous with a "dwelling-house let in separate tenements." Consequently, this decision throws upon medical officers of health the responsibility of deciding the question of the construction of dwelling-houses used in separate tenements, and whether a dwelling-house in which the separate tenements are not structurally severed, as well as those in which they are structurally severed, is or is not so constructed as to afford suitable accommodation and provide due sanitary requirements, and if not, what accommodation and sanitary requirements should be provided.

If it is allowed that a house so constructed that every room opens separately on to the staircase, as in an ordinary dwelling-house constructed for one family, is a house affording suitable accommodation for two or more families, then any such house could be adapted or altered, and it would only remain to decide what additions or alterations would entitle such a house to a certificate.

In order to be clear, we must define what we are dealing with, and we must have in mind that the definition of erections may be (a) according to structure, and (b) according to usage.

According to structure, we have the terms "building," "house," "room."

According to usage, we have the terms "tenement," "habitation," "dwelling," "lodging."

Building.—Any structure, provided it has some sort of attachment to the ground, and some sort of roof, appears to be a building in law.

House.—In law "a house is an enclosed space, with walls, a roof, and an entrance capable of being closed" (1881, *Esdail v. Metropolitan, etc., Railway Company*, Lands Clauses Act, 1845, per Cave, J.; see 46 J.P., 103). According to the instructions issued for the guidance of enumerators at the Census of 1891, "all the space considered a separate house, by however many families, living in distinct tenements or apartments, it might be occupied." This last definition of a house is on the lines of Rule 6 of Schedule B of 48 George III., cap. 55, above quoted, and under which the case of *Attorney-General v. Mutual Tontine Westminster Chambers Association, Limited*, was decided.

The recent decision in the case of *Rogers v. Hosegood*, reported in the *Times* of November 8th, 1899, throws another light upon what is a house. Mr. Justice Farwell, in delivering judgment, said, "... I cannot see any substantial difference, for the purposes of a covenant

of this nature, between a terrace of adjoining residences, separated from one another vertically, and a pile of residences separated from one another horizontally. If the building of the defendant was carried no higher than the ground-floor, it would, in my opinion, be impossible to contend that each of the residences opening on to the inner area was not a separate house, and I cannot see that the superposition of seven other rows of residences can make any difference. This is a mere question of construction, on which a rating case such as that cited (*Attorney-General v. Mutual Tontine Westminster Chambers Association, Limited*, 1 Ex. D., 469) can have little bearing; but I would point out that in that case the Court held that the whole block was a house, but pointed out that each set of chambers might be a house also. The case of the *domus mansionalis*, cited at p. 477, has some bearing on the point. . . . But even if the whole structure could be regarded as a private residence only, it is difficult to see how thirty or forty different families and establishments can find place therein, unless the owner of such entire messuage is carrying on the trade of letting apartments." This last paragraph of the decision is important as bearing upon those piles of artisans' dwellings constructed in separate and self-contained dwellings with outside staircases, which, in accordance with the judgment in the case of the Model Lodging House, Streatham Street, Bloomsbury, decided in 1853, are regarded as constructed in separate houses, and are each assessed separately by the Commissioners of Inland Revenue, and in consequence of which some doubt is thrown upon the power of a sanitary authority to register such houses under the bye-laws for houses let in lodgings. The last paragraph of Mr. Justice Farwell's decision tends towards removing this doubt. This question is one that this Society should seriously consider in all its bearings, but it is not desirable to pursue it further here.

Room.—Any apartment in a house, or any division separated from the rest by a partition, may be called a room. The elasticity of this word is considerable.

Now as to usage:

Tenement.—In law a tenement is any species of permanent property that may be held, and may be the whole or part of a premises, building, or house. In popular parlance, it has come to mean a room or rooms let to one family or person as a tenement in a house let out in separate dwellings.

Habitation.—For our purpose this means human habitation, and a place occupied for human habitation would appear to have a more extended meaning than a dwelling-place.

Dwelling.—In law the essential part of dwelling appears to be sleeping or passing the night. This view prevails at the revision of the lists of Parliamentary voters who claim upon a dwelling, residence, or abode; and in the Public Health (London) Act of 1891, as well as in the Public Health Act of 1875, an underground room in which a person passes the night is deemed to be occupied as a dwelling.

Lodging.—It would appear that whereas a tenant, in consideration of the payment of rent, may by agreement or lease obtain exclusive possession of another's property, and can maintain trespass, a lodger, although paying rent in consideration, has only the license to use, but not to exclusively occupy, and cannot maintain trespass; so that a lodging appears to be dependent upon the absence of an agreement or lease.

In addition to these single words, certain terms compounded of these words are used—dwelling-room, dwelling-house, inhabited building, inhabited house, inhabited room, tenement building, tenement house, tenement dwelling-house. The last is often abbreviated into tenement-house, meaning a dwelling-house let in separate tenements, and it may be assumed that the word inhabited, or habitation, does not necessarily imply dwelling. It would also appear that a "house let in lodgings" includes a house let in separate dwellings, whether self-contained, self-complete, or neither, in which the several occupiers dwell without agreement or lease to define their respective liabilities; hence probably the reason for bye-laws for houses let in lodgings, as in any class of dwelling-house let in separate dwellings some part of the house is used in common by the inmates.

The legal definition of a *dwelling-house* is most important.

For the purpose of rating to the poor, the presence of a door shutting off the house from the street, and common to the use of two tenants, together with a common stair, was adjudged not to substantially affect the occupation, which was for all practical purposes distinct, and the Court was of opinion that the appellant, who was non-resident, was entitled to have flats separately assessed for rating purposes (see *Saunders v. St. Mary, Lambeth*, *Times*, February 12th, 1891, County of London Sessions, before Sir P. H. Edlin, Q.C., Chairman, sitting at Clerkenwell).

Also for the purpose of rating to the relief of the poor, a "dwelling-house" includes part of a house occupied as a separate dwelling which need not be structurally separated from the rest, and the occupants using a common w.c. (see *Allchurch and Another v. The Assessment Committee of the Hendon Union*, before Mr. Justice

A. L. Smith and Mr. Justice Grantham, reported in the *Estates Gazette* of April 18th, 1891, and an appeal before the Master of the Rolls and Lords Justices Bowen and Kay, reported in the *Estates Gazette* of July 11th, 1891).

I mention these rating cases as bearing upon the point, because originally a house was only taxed separately to the window-tax (which subsequently became inhabited house duty) when it was a separate dwelling-house, as defined by Rule 6 in the year 1808. This definition has had, or is having, gradually lopped off from it, for one purpose or another, the private street-door and private staircase (*Saunders v. St. Mary, Lambeth*), the private w.c. (*Allchurch v. Hendon Union*), the private wash-house (*Seaman v. Lee*), until nothing will be left but the single room. What will happen to the assessment of an old eight-roomed house, occupied by eight families, one in each room, when it comes to be treated in the same manner as the new house containing eight dwellings of three or four rooms each, the test in each case being confined to the single entry to each dwelling? since local rating authorities no longer appear to take into consideration the outside or open stair, although the Commissioners of Taxes do so still. In one respect the two classes of authorities appear to be diverging in the same line—namely, in regarding a dwelling with but one entrance or front-door as "structurally severed," with less regard than formerly to what the dwelling contains, although in this respect in different localities the standard differs. But, as I know dwellings that have associated sinks and taps on balconies, and associated w.c.'s, as well as associated wash-houses, all of which dwellings have been exempted, and whose owners have not applied to me for certificates, I can only assume that no regard is paid as to whether a dwelling is self-contained, or self-complete, or associated.

Practically what happens is that, at the quinquennial assessment, the rating authority assesses separately all structurally severed dwellings, whether self-contained, self-complete, or associated, and the Commissioners of Taxes lump together those in each compound house with an inside staircase. If the owner objects to be taxed on the lump sum, he is referred to the medical officer of health, and the Board of Inland Revenue consider a fresh certificate of the medical officer of health indispensable at each quinquennial assessment; so that the medical officer of health's certificate is practically supplied for the purpose of overriding the open staircase if he is of opinion that it is a better sanitary arrangement to have it closed.

If we analyze dwelling-houses, we shall see more clearly in a

table of classification the relationship of usage and construction of the several kinds of dwellings to each other:

CLASSIFICATION OF DWELLING-HOUSES.

The simple dwelling-house (used as one dwelling).

The compound dwelling-house (used as two or more separate dwellings).

A. The dwellings structurally severed, and the staircase either (i.) outside, or (ii.) inside, and if inside, either (1) permanently open to the outer air, or (2) closed by windows or skylights, or not directly lighted.

(a) The severed dwellings self-contained (*i.e.*, each dwelling having only one entrance, and containing within its precincts, at the least, room for sleeping, living, cooking, draw-tap and sink, w.c., and wash-house or scullery that can be improvised as a wash-house).*

(b) The severed dwellings not self-contained, but self-complete (*i.e.*, each scullery, w.c., or wash-house, although outside the dwelling, being reserved for use by the occupiers of one dwelling only, and kept under lock and key by the tenant).

(c) The dwellings not self-contained or self-complete, but associated.

1. With associated sculleries, or taps and sinks.
2. With associated w.c.'s.
3. With associated wash-houses, or coppers or troughs.

B. The dwellings not structurally severed, and the staircases not outside or permanently open to the outer air.

1. With common intercommunication, or landings upon which each of the rooms open separately—*e.g.*, made-down houses.
2. With common landings and common living-rooms *e.g.*, (a) hotels, boarding-houses, residential clubs; (b) with separate cubicles in common dormitories or corridors—*e.g.*, Rowton lodging-houses.
3. With common landings, common living-rooms, and common sleeping-rooms—*e.g.*, common lodging-houses.

* For an analysis of the essential requirements of a dwelling, see "Dwelling Accommodation in Large Cities," *Journal of the Sanitary Institute*, part i., vol. xx., 1899.

The Commissioners of Taxes require an outside or open stair to the building, and a single entrance to each dwelling, as a condition of separate assessment of each dwelling, in order to exempt from inhabited house duty—that is, a premium is allowed for such method of construction and adaptation, which sanitarily, as far as it goes, is a good condition. But the onus of certifying that such condition is unnecessary is thrown upon the medical officer of health—in short, he is placed in the invidious position of certifying that a lower sanitary standard should be accepted in this respect by the Commissioners than that which has hitherto guided them.

Referring to the table of classification, practically all those dwellings classed under "A"—that is, those dwellings structurally severed, or that have only one entrance, provided they have an outside or open staircase—are exempted from inhabited house duty; but if they have an inside or enclosed staircase, they are referred to the medical officer of health. That this should be the only reason, as it actually is in fact, for referring the method of construction to medical officers of health, is sufficiently obvious to show the anomalous position of these officers, especially when I assure you that I know of a block of absolutely back-to-back dwellings of two, three, and four rooms rewarded for their method of construction by the remission of inhabited house duty, no certificate being required, because the common stair is open to the air, and each dwelling has but one entrance.

Is a medical officer of health justified in giving a certificate to enable an owner to enclose an outside staircase? or is he justified in giving a certificate that a house let in separate dwellings is properly constructed if the common staircase and landings being inside are not permanently open to perfilation?

There are a number of reasons for requiring that the common stair should be through-ventilated. The fundamental objection to a closed air-shaft formed by the staircase is the common usage of the same air by a number of different families; the effect of this is the spread of infectious diseases, and especially of those that attack children, and that are more often nursed at home. Another objection is that the chimney of a dwelling-room, when a fire is burning in the grate, exerts an enormous suctional power, and every burning grate is an extractor, the air to which in a closed house with an enclosed staircase is supplied by the down-draughts of the chimneys of the unlighted fires. Hence in made-down tenemented houses, let out in one- and two-room dwellings, the doors of the rooms are frequently ajar, and the tenants nearly always complain of smoky chimneys. What else could be expected in an enclosed house with

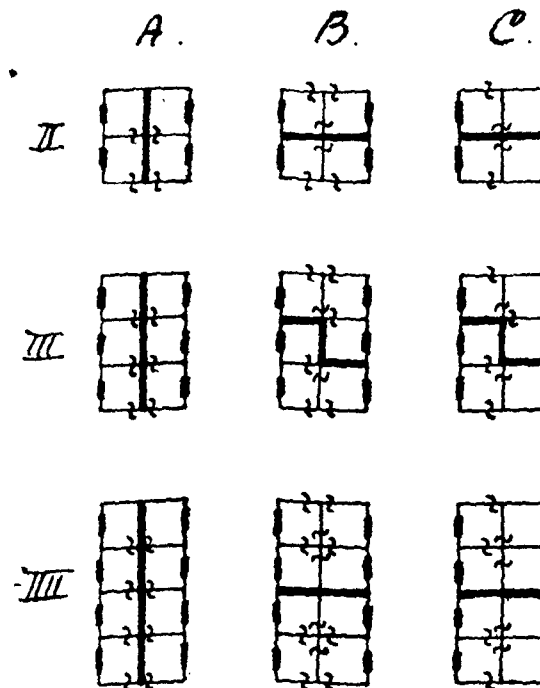
all the fires burning at the same time? When, furthermore, the w.c.'s open on to the common staircase, so that air-supply to the house is drawn through them, the condition becomes still more unjustifiable.

When, added to all this, we are clamouring for open air, perfilation, and through-ventilation as the most efficient protection against tubercular diseases, especially consumption of the lungs, then, on the grounds of health, it is impossible to maintain that suitable accommodation and due provision is made in a house let in separate dwellings unless the common stair is amply and permanently ventilated to the open air, preferably at every floor.

Section 69 of the London Building Act, 1894, provides that (1) in every building constructed or adapted to be occupied in separate tenements by more than two families, the principal staircase used by the several families in common shall be ventilated upon every story above the ground-story by means of windows or skylights opening directly into the external air, or shall be otherwise adequately ventilated; (2) the principal staircase in every building being a dwelling-house, and not subject to the provisions of subsection 1 of this section, shall be ventilated by means of a window or skylight opening directly into the external air.

This section is an attempt in the right direction, but does not meet the case sufficiently, since a closed window or skylight, over which everybody, and therefore nobody, has control, may be a means of lighting, but is an utterly unreliable means of continuous through-ventilation or perfilation, as such windows are invariably closed. Continuous perfilation by means of permanent openings is the only method of construction of permanent value.

In order to provide against back-to-back dwellings I must again insist, as I have done on several occasions before, that one of the conditions of a certificate should be that every dwelling of two or three rooms should have one of the rooms situated on the opposite side of the building on which the other room or rooms are situated, and every dwelling of four rooms two of such rooms so situated, and that between each pair of front and back rooms there should be a door of communication for purposes of access and perfilation, and no other means of entry to the other room be provided, otherwise by making the access from the common stair the dwellings may still be constructed as back-to-back dwellings, or simply converted into them by locking the door of intercommunication between the front and back rooms. The following diagram illustrates the three stages A, B, and C in dwellings of 2, 3, and 4 rooms:



*The signs S show doorways
No staircases shown.*

To explain this diagram it must be premised that in a building two rooms deep with dwellings let in single rooms it would be impossible to have the window of a single room opening on to both fronts of the building, and so the principle of through ventilation for single or odd rooms cannot be made to apply; the diagram therefore shows two (II.), three (III.), and four (IIII.) room dwellings (horizontally) in three stages, A, B, and C, (vertically).

The "A" column shows a two, three, and four-roomed dwelling constructed respectively with only one entrance and back-to-back. The "B" column shows the application of the requirement that "every dwelling of two or three rooms should have one of the rooms situated on the opposite front of the building on which the other room or rooms are situated, and every dwelling of four rooms two of such rooms, and that between each pair of front and back rooms there should be a door of communication," but it also shows how, if two entrances are allowed, perfilation or through ventilation may be defeated by locking the doorway between the front and back room. The "C" column shows the effect of requiring also that "no other means of entry to the other room be provided," since

on every occasion of entry and when the doorway is open more or less between the front and back room and the window is loose, ajar, or open, the opportunity for perfilation is constantly recurring. There is also another advantage in these requirements in buildings when facing north and south: some of the rooms are then situated on both sides of the building instead of being like those in the "A" column, the left-hand rooms of which when facing north are altogether deprived of sunlight as well as moving air.

On February 12th, 1897, this Branch of the Society adopted certain recommendations with regard to certificates under the Customs and Inland Revenue Acts, 1890 and 1891, which recommendations were published in PUBLIC HEALTH for March, 1897, vol. ix., p. 183.

In those recommendations no provision was made for continuous perfilation or permanent through-ventilation of the common staircase, landings, and passages.

No provision was made for perfilation or through ventilation of the rooms, nor against back-to-back dwellings.

No provision was made for cutting off acrially the water-closets from the dwellings and from the common stair.

No provision was made for the area of sleeping and living rooms, and an error was made in stating this to be defined by the London Building Act, 1894. In section 70, as to habitable rooms, there is no such provision, although there is a provision that every habitable room except rooms in the roof shall be at least 8 feet 6 inches in height.

For these reasons the recommendations need revision, and the remaining recommendations were:

That there should be a sufficient and available supply of water on every floor;

That there should be at least one water-closet, properly supplied with water, for every twelve occupants or less on every floor;

That the drainage of the premises should be in accordance with the regulations recognised by the authority in whose jurisdiction the house is situated; and

That accommodation for clothes-washing should be provided, sufficient for the number of persons inhabiting the house.

It must not be assumed that these minimum requirements for a certificate cover the ground for buildings of the latest erection or to be hereafter erected. This ground is better covered for new buildings by the London Building Acts, 1894 and 1898, and the special requirements therein for artisans' dwelling, and the building regulations for this class of buildings approved by the London County Council on December 3rd, 1889.

Referring now again to the table of classification, it will be seen that the High Court decision in the case of *Seaman v. Lee* covers, in addition to those dwellings contained under "A.," structurally severed, whether self-contained, self-complete, or associated, also those dwellings contained under "B. 1," dwellings not structurally severed, and the stairs not permanently open to the air, such as many houses let in lodgings and made-down houses, or houses originally constructed for one family and occupied by many. Is it possible to ameliorate the condition of these made-down tenemented houses? There are some of which it can be said that it is neither possible nor desirable, others that are doubtful, and others, again, of which there may be possibly some hope that by additions and alterations an improved condition might be brought about. These houses have been constructed originally for one family—that is, vertically, and not horizontally as for more families than one. Therefore the problem would be: (1) the structural conversion of a vertical dwelling-house into a house of horizontal dwellings; (2) the cost of such conversion; and (3) the recoupment towards the cost from the remission of inhabited house duty.

The structural conversion, assuming the rooms to have proper height and area, would involve the provision (1) of ample through-ventilation of the common stair; (2) of through-ventilation to the dwellings from one front to the other; (3) of w.c. with access lobby on each floor (one w.c. for every twelve persons is already required in all houses by the L.C.C. bye-laws); (4) draw-tap and sink on each floor; (5) drainage in accordance with bye-laws and regulations; and (6) clothes-washing accommodation. The two last are frequently found already provided.

Now, it is obvious that by providing the first somewhat more completely and making the common stair permanently open to the air, and providing the second by making the dwellings to open only by one entrance on each floor, the owner might claim exemption from inhabited house duty on the ground that the dwellings are now separate houses, and render it unnecessary to go to the expense of any further provision with the object of obtaining a certificate.

That this possible course has not been adopted by owners tends to show that the expense of even the lesser structural conversion is greater than the recoupment of a few shillings or perhaps pounds annually from the remission of inhabited house duty would financially justify.

rent; that 46 per cent. pay from one-quarter to one-half; 42 per cent. from one-fourth to one-fifth, and that only 12 per cent. pay less than one-fifth of their income in rent. It is also to be remembered that the poor not only pay more for their houses, but also for many of the necessities of life, such as vegetables, groceries, coal, and so forth. It is generally agreed that the amount of rent paid should not be more than one-tenth to one-seventh of the income, and allowing for the fact that the actual labouring classes have not so many additional expenses outside the bare necessities of life as compared with the requirements of those in only a slightly better position in respect of income, who have to spend more on their outward appearance, possibly the higher figure of one-seventh would be a fairly correct estimate of the amount of rent working-class people can reasonably be expected to pay.

Speaking in general terms on this basis,

	s.	d.		s.	d.
If a man's income is 15 0 a week, his rent ought not to exceed	2	1			
" " 18 0 " " " "	2	7			
" " 21 0 " " " "	3	0			
" " 25 0 " " " "	3	7			
" " 30 0 " " " "	4	3			
" " 35 0 " " " "	5	0			
" " 40 0 " " " "	5	8			

It appears to me that what is required at the present time in districts of this description is a class of house having, some two and some three bedrooms, to suit large and small families, which could be let at a rental of from 3s. 6d. to 5s. 6d. a week, as this appears to be about the amount which this class can be expected to pay at a distance out of London.

But what do we find? Inferior accommodation of the kind I have mentioned, with rentals of from 4s. 6d. to 7s. 6d. a week, which necessitates two families frequently living in one house, and the taking in of lodgers when the houses are already too small for the present occupiers; and it is no uncommon thing for a man, wife, and four or five children occupying a house with only two bedrooms to take in a lodger.

It is also a fact that, when cleansing, structural repairs, improved drainage, etc., are insisted on by the local authority—little or nothing having been done for years—the rents are at once raised, and cases have come to my knowledge where the rents have been raised even for the necessary cleansing after a case of infectious illness, or even for the provision of a movable dustbin. Further than this, during the last few weeks I found that rents had been

raised about twelve months previously on account of *prospective repairs*, which, it was anticipated, would be insisted on by the local authority. Under conditions of this kind I see no available course open but for local authorities to intervene.

The extortionate rents obtained from many working-class people even in those cases where excessive overcrowding is not apparent, and where the houses are in fair condition, is detrimental, and leads to many evils; their food and clothing are barely sufficient, lodgers are taken in, the mothers go out to work or take work in to do at home amid insanitary surroundings, while they have barely time to attend to the needs of their own families, and a few weeks' loss of work leaves them hopelessly behind-hand in their finances.

It is not to be expected that at the present time, when labour in all its branches is very expensive, and when all kinds of building materials are extremely high-priced, that private individuals will do much in the way of building working-class dwellings, as a very small percentage only can be expected on the outlay, and it therefore remains for local authorities to take the matter into their own hands and see what can be done under the Housing of the Working Classes Act.

Since 1890 the loans sanctioned by the Local Government Board under the Housing of the Working Classes Act, and the Artisans' and Labourers' Dwellings Improvement Act of 1875, have amounted up to the commencement of the present year to £885,784 in English provincial towns and districts alone, and exclusive of much spent under local Acts.

Urban and Rural District Councils have but in a few cases adopted the Act. The Urban District Councils of Barnes, Hornsey, Leigh, Waltham, and Linthwaite are examples of urban districts in which work has been carried out. Among Rural District Councils the Thingoe Rural District Council (Suffolk) still appears to be the only Rural Council which has actually built. This was not a financial success. Eight cottages were built there in 1891-92 under Part III. of the Housing of the Working Classes Act, at a cost of £1,700, including the land (four acres). The cottages are let at £5 5s. a year, and 2d. a rod for twenty-seven rods of land to each cottage. The money was borrowed at 3½ per cent., and the term of repayment was thirty years. The low rent obtained, only a fraction over 2s. per week, and the short period for which the loan was granted, are evidently the crippling factors. Surely the loan for cottages and land might well be extended over a period of fifty years. It is surprising to realize the difference in the annual repayments required, whether the repayment has to be made in thirty or in fifty years.

This is shown in Alderman Thompson's Report on the Housing of the Working Classes in the Borough of Richmond (Surrey). It is there pointed out very clearly that the difference between a loan for thirty years and one for fifty years is equivalent to nearly 6d. a week in rent, or £1 5s. per annum, on every £100 of capital outlay, representing in a £300 dwelling about 1s. 6d. a week. A reduction at the same time in the rate of interest might make a saving of as much as 2s. 6d. per cottage per week.

It is scarcely to be wondered at if clerks to local authorities are not very enthusiastic in furthering the adoption of this Act, when the Act itself is somewhat intricate, and the time, correspondence, and responsibility in bringing a scheme to a successful issue is so heavy and tedious; yet this is the Act under which we have to work, though in all probability more practice in its application would make procedure easier, or would, at any rate, prove in what particulars amendments are most needed.

One of the few rural villages in the country where work is going on under Part III. of the Act is Penshurst in Kent. This is a village having a population, in 1891, of 1,647, with an area of 4,568 acres, and a ratable value of £9,777. It is residential and agricultural in character, and is not rapidly increasing.

The chronological stages in the carrying forward of the work are interesting, and for the dates and various particulars I am indebted to the kindness of the hon. secretary of the local committee (Miss Escombe):

November, 1895.—First proposal made on the subject in the form of a resolution at the Parish Council meeting. The motion was rejected.

April, 1896.—A new Parish Council elected; pledged to endeavour to put Part III. of the Housing of the Working Classes Act into force. A committee was formed for this purpose.

July, 1896.—Committee reported. This report was printed and issued to landowners, with letter requesting information as to whether the landowners were themselves prepared to build cottages.

October, 1896.—The answer to this appeal having proved that private enterprise could not be relied on to supply the much-needed cottages, the Parish Council called upon the District Council to take the necessary steps to put Part III. of the Act into force. District Council made inquiry as to the willingness of the landowners to supply the cottages, and received the same unsatisfactory answer as was given to the Parish Council.

March, 1897.—District Council held an inquiry at Penshurst to satisfy themselves of the need, and, being satisfied with the evidence produced, applied to the County Council.

July, 1897.—The County Council held the public inquiry at Penshurst, granted the necessary certificate, and declared urgency.

November, 1897.—Parish Council urged District Council to move forward and appoint a joint committee, nothing having yet been done.

December, 1897.—Joint committee was formed, and held its first meeting.

March, 1898.—Land secured for site; competitive plans advertised for.

September, 1898.—Tenders for building were invited.

October, 1898.—Tenders being in excess of architect's estimates, the plans were revised by the architect.

November, 1898.—Builders' revised tenders accepted by District Council.

December 31. t, 1898.—Plans sent to Local Government Board, and a loan of £1,800 applied for.

March 6th, 1899.—Local Government Board held an inquiry.

June, 1899.—Local Government Board demanded that a well be sunk, and drainage-scheme submitted before granting loan.

September, 1899.—Local Government Board sanctioned loan.

October, 1899.—Application made to Public Works Loan Commissioners, and loan of £1,800 granted for forty years.

November 9th, 1899.—Seal of District Council was to be affixed to deed of purchase of site from Ecclesiastical Commissioners.

November 25th, 1899.—The seal of the District Council was to be affixed to builders' contract. Builder ready to commence work.

It is thus apparent that more than two years elapsed between the time of the holding of the County Council inquiry, when urgency was declared, and the time when building could actually commence.

Provision is made for six lobbied cottages arranged in pairs. The site ($\frac{3}{4}$ acre, and freehold) was obtained from the Ecclesiastical Commissioners by arrangement for the sum of £130. The estimated cost of building the cottages is £1,576 10s. 9d., or about £525 per pair. The loan is for £1,800; interest and capital, repayable in forty years, at £4 2s. 9d. per cent. The annual payment is therefore £74 9s. 6d., and a rent of 5s. a week should produce £78, leaving a margin of £3 10s. 6d. for repairs.

The most diverse conditions are to be found in the cottages of the purely agricultural labourer. Many cottages, particularly those on the large estates of resident landowners, are of an excellent type, and let at rents impossible to produce but the smallest percentage on the original outlay. Others, though owned by well-to-do persons, may be found in very indifferent repair; but undoubtedly the worst kind of cottages are those owned by persons of small means, who want to make every penny they can out of them, at the same time executing a minimum of repairs.

It is impossible, at a rent of about 2s. or 2s. 6d. per week, which is the average rent the ordinary agricultural labourer can afford to

pay, for cottages to be built at the present time with a prospect of returning a reasonable percentage on the outlay, and any suggestion by which the price of building cottages can be reduced without materially affecting their healthiness to live in must be regarded with favour.

The question of building wooden bungalows where land is cheap has been practically brought forward in one part of my district, and a modification of the bye-laws proposed in this respect. The suggestions are not finally approved by the Local Government Board, but broadly the conditions are that the buildings must be only one-storied, and comply with the bye-laws as to footings and concrete over the site; the brickwork to reach 6 inches above the ground-level, and be provided with a damp course; also that each dwelling be limited to an area of 600 square feet, with capacity of 6,000 cubic feet, and the buildings to be at least 50 feet from each other. I must say that I cannot see the object of limiting the capacity to this extent.

Steel-framed buildings have also been suggested, something after the skeleton frames of the American "sky-scraper"; while the Cunnah-Wright system appears to offer several distinct advantages, being easily erected, fireproof, and warm for a minimum of thickness of wall.

Well-built brick or stone houses have certainly a life of over 120 years, and the land would in all probability increase in value, so that it seems evident that the periods of granting loans might with safety be considerably extended.

It has, I think, been over and over again practically shown that no one set of measures can be applied as a panacea for the defects in the dwellings and the overcrowding among our working classes; but each locality must be dealt with on its own merits, according as it is metropolitan, suburban, extra-suburban, or distinctly rural, in addition to which cities and large provincial towns with their suburbs will require the most energetic and unselfish consideration at the hands of all local municipalities. The education of the working classes in sanitary matters to stimulate their desire and appreciation of more healthy dwellings, and the persuasion of local authorities to be more ready to put in motion the extensive powers which they now possess, will not be among the least powerful agents in promoting improvements which are so much to be desired.

DISCUSSION.

Dr. THRESH said that the subject of the address was one of great interest to him, as it was one which had engaged his attention for many years. There were, however, many difficulties in the way. There was, first, the difficulty of

obtaining the land for building dwellings on for the working classes; then many of the requirements of the Local Government Board were unreasonable, and the Board would not give way on any point. The result was a greater increase in cost, and as in rural districts the rent of cottages should not be more than 3s. a week, the deficit would have to be borne by the ratepayers. In two instances where it was proposed to put the Act in force landowners had come forward and built cottages. Some cottages had been built at a cost of £100 each as the result of private enterprise. He had not yet seen the plans, but he was afraid the Local Government Board would hardly sanction this kind of cottage; the walls, he believed, were only one brick thick. In one of his districts, which used to be one of the most overcrowded, the local authority had put up a number of cottages, and it was now one of the best. The cottages were let at 3s. a week, and there would probably be a deficit of from £15 to £20 a year.

Dr. J. J. CLARKE (Walthamstow) considered that most of the insanitary conditions of the houses of the working classes were produced by the people themselves. The first thing to do was to educate the working classes. In two or three years a house was rendered quite unfit for human habitation.

Dr. WATERS (Southend-on-Sea) said that until people were given an opportunity of being clean, they could not be accused of being dirty. It was not uncommon to find two families occupying one house, with fourteen or fifteen persons using one w.c., and having no bath-room. He quite agreed that the medical officer of health should not devote the whole of his time to hunting the bacillus, but should look to the housing of the working classes. Local authorities should build sets of dwellings for the working classes at different corners of the towns, and certain houses should be kept empty in which families could be placed while their houses in which infectious disease had occurred were being disinfected. The objection to shelters was that people had to be removed from one end of the town to the other, and perhaps to a distance from their work.

Dr. SANDERS (West Ham) said that in his district they were committed to a very large housing scheme. They were applying to Parliament for powers to acquire land for the purpose of erecting 3,000 houses for the working classes. Twenty houses had been built at a cost of £400 per house; these were let at 6s. for the lower part, and 6s. 6d. the upper part of the house. He was not in a position to say if they would pay or not. The question of houses for the very poor had not been touched upon.

CORRECTION.—We learn that Dr. Thompson, in his paper on "The Guidance of Public Efforts towards the Prevention of Consumption," in referring* to Dr. Ransome as "of Nottingham," should have described that gentleman as "of Manchester."

MEDICAL OFFICER OF LOCAL GOVERNMENT BOARD.—The President of the Local Government Board has appointed Mr. William Henry Power, F.R.S., the Assistant Medical Officer and Medical Inspector for General Sanitary Purposes of the Board, to the office of Medical Officer of the Board, in the room of the late Sir Richard Thorne Thorne, K.C.B. Dr. H. Franklin Parsons has been appointed Assistant Medical Officer and Medical Inspector for General Sanitary Purposes, and Dr. R. Bruce Low has been appointed an Assistant Medical Officer of the Board.

* See pp. 256 and 257 of this volume (January, 1900).

LOCAL STATISTICS.*

By W. H. SYMONS, M.D.,
Medical Officer of Health of Bath.

WHEN you elected me President of this Branch, I accepted the position without hesitation, recognising the honour as one done to the city of Bath rather than to me personally. As most of you are my seniors in the sanitary service, I am sure you will forgive me if I do not attempt any lengthy Presidential Address, but merely make some remarks upon local statistics.

I have only recently discovered what a considerable area this Branch is supposed to represent. There are about 300 persons eligible for membership, but we only number fifty-two members, and as a rule not more than a fifth of these attend an average meeting of the Branch. Why is this? Are we medical officers of health individually so independent and self-reliant that we can neglect combination, or are we generally so poorly paid, so undervalued, that we cannot give time and attention to preventive medicine as a separate profession? Roughly speaking, the medical officer of health gets about one penny per year per person for looking after the health of the people, and there are in England, apart from London, only about 120 appointments where £200 a year is paid.† Fortunately, neither the quantity nor quality of the work done is measured by the payment received, and we need in our society the support of every medical officer of health.

Dr. Newsholme, in his address to the Incorporated Society, "A Contribution to the Study of Epidemic Diarrhoea,"‡ said: "If during the present year's history of our Society each branch were to invite and receive contributions on this subject, based on local experience or on special investigation, it would be found at the end of the year that we had done a piece of splendid work in the advancement of public weal." He did not, however, suggest any common plan of action, and I have no doubt we at present report the results of our individual work.

I cannot mention diarrhoea without drawing attention to the want of uniformity in classifying diseases under this heading, which, as has so often been stated, renders our so-called zymotic death-

* Presidential Address read before the West of England and South Wales Branch of the Incorporated Society of Medical Officers of Health, at the Annual Meeting, November, 1899.

† *Vide Medical Press and Circular*, p. 487, April 22nd, 1896.

‡ *PUBLIC HEALTH*, vol. xii., p. 139 (December, 1899).

rates valueless; and I think we, as medical officers of health, could do even more than we do to improve the methods of certification, registration and classification at present adopted. I find nearly 10 per cent. of the certificates which come to me are valueless for statistical purposes, and while this laxity continues special death-rates can be of little real value. I am afraid some of those who have had most training in pathology are the greatest sinners, and as it is so much easier to ascribe death to "marasmus," for example, than to ascertain the cause of the wasting, such vague terms will linger long among us; but a polite note of inquiry will often enable us to put the death more definitely under "other tubercular diseases," or some other heading.

Some efforts are being made to induce the Registrar-General to make registration correspond with sanitary districts, but it appears to me that the present registration district is the better unit. The age and sex constitution of the population more nearly approaches the English standard, and public institutions cause less disturbance. Notification returns would be more strictly comparable if they were given for registration districts; the present system is unfair to urban districts.

Take for example Bath, and the notified cases of enteric fever. Bath Registration District covers an area of 30,727 acres, and in 1891 possessed a population numbering 75,196; the Bath Urban Sanitary District has an area of 3,382 acres, and an enumerated population of 51,844. Many, if not most, of the cases of enteric fever occurring in the registration district are treated in the Royal United Hospital, situated in the city of Bath, and often are not notified until they have been some days under observation. This year fully one-third of our cases have been those brought in from the rural district for treatment, but so far they have always been included in my weekly returns to the Local Government Board. Anyone working up statistics from the Local Government Board's report would regard these as belonging to Bath, and would calculate the rate of incidence on the population of the city, and not on that of the registration district.

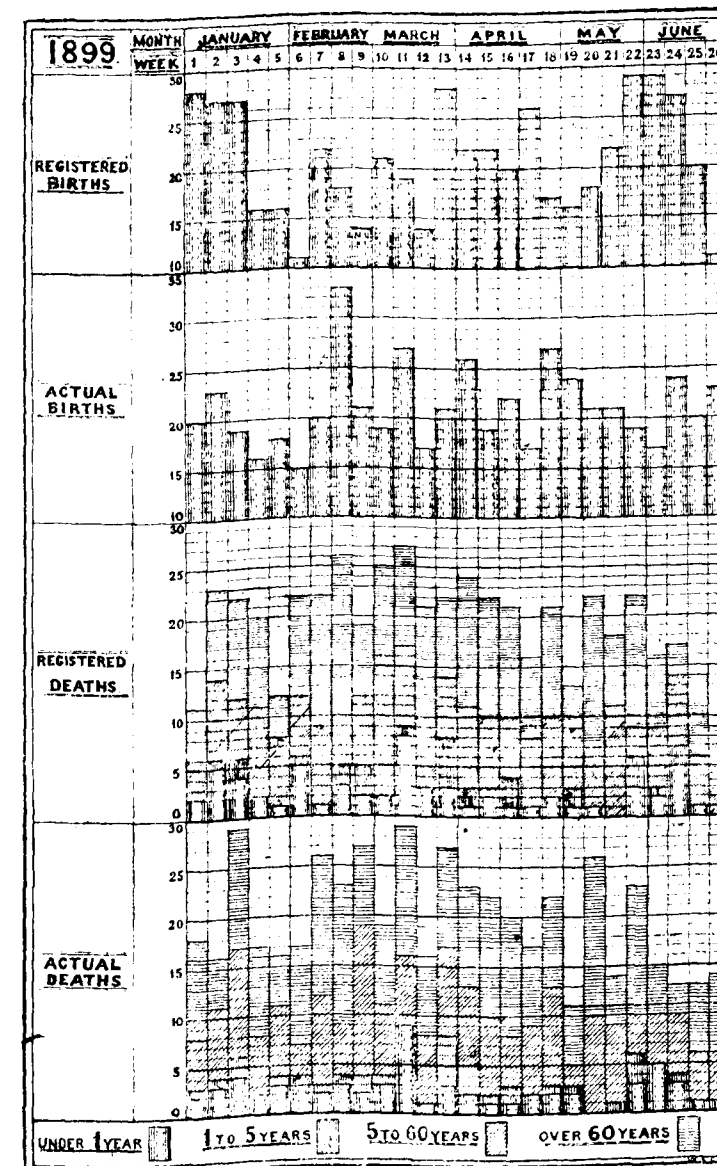
As regards the classification of disease, I suppose we must regard the Registrar-General's classification as the best possible and as a fixture. But it seems unreasonable to classify cerebral hæmorrhage under diseases of the nervous system, while the rupture of a degenerated bloodvessel in any more solid organ would be properly ascribed to diseases of the circulatory system. Then, again, do we adopt any uniform method in the classification of heart disease and bronchitis? Do the terms "bronchitis and heart disease" and

"heart disease and bronchitis" generally represent correctly the primary and secondary causes of death? Last year in Bath we registered nine deaths from "heart disease and bronchitis," while we had nineteen from "bronchitis and heart disease." The former I classified under a separate heading among diseases of the organs of circulation, and mentally considered them as possibly due to telluric conditions, such as may be supposed to favour rheumatism, while the latter came under diseases of the organs of respiration, and might be associated more directly with atmospheric conditions. The ages at death did not differ materially in the two groups. I do not know if I am right in considering cardiac disease as more often the cause than the result of simple bronchitis, but from the point of view of local statistics this is somewhat important.

Referring again to special death-rates, even with correctly classified deaths, the zymotic death-rate is fallacious, because it measures diseases peculiar to children as a rate per 1,000 persons of all ages. This fallacy is particularly obvious in the returns for Bath, where we have so few young people. Thus, instead of having at the 1891 census 351 children under 15 years of age among each 1,000 persons of all ages, we only had 275, and in one of our subdistricts, Bathwick, only 205. It therefore follows that a zymotic death-rate of 1 per 1,000 in Bathwick is equivalent to 1.707 per 1,000 in England and Wales. The factor of correction for Bath itself is 1.275. The zymotic death rate for last quarter was given as 2.28, but if corrected for age constitution of the population it would have been 2.91. I may say I include deaths from infantile gastro-enteritis. Without the diarrhoeal diseases the zymotic death-rate would have been 0.28 per 1,000.

These figures show how necessary it is to correct rates for age and sex constitution if we are to use them in any way for comparisons. I suppose most of us think the so-called zymotic death-rate of much less value as a standard than infantile mortality, yet we still continue to give prominence to the zymotic death-rate, because the people love to have it so. But statements regarding weekly returns of deaths among young children would look strange if given in terms of deaths per 1,000 births, although such a return, if based upon the average weekly number of births for the past ten weeks, would tell us far more than any weekly rate at present considered. Weekly rates are, however, altogether misleading, even for large towns. The numbers of births and deaths registered have no relationship to the numbers of births and deaths which actually occur in that or any other week, as may be seen from the diagram on the opposite page, in which I have shown

by columns the actual and registered numbers of births and deaths for the first twenty-six weeks, 1899. In the eighth week I reported to my authority that eighteen births had been registered,



while the actual number of children born in that week was thirty-three; and, again, in the twenty-third week I reported twenty-nine registered, when the number born was seventeen.

Although deaths are registered much earlier than births, there appears to be quite as much variation between registered and actual deaths. Thus, in the twenty-eighth week of 1899 I reported sixteen deaths registered, but only eight persons died that week in Bath, while in the following week I reported four deaths registered, which gave us a record weekly death-rate equal to 4 per 1,000 annually, but nine persons died in Bath that week. It must be remembered that these figures show the variation between registered and actual births and deaths in a population of 52,000 persons, and even in much larger districts the variations must still be considerable enough to make figures for weekly periods of no value for comparison with the climate of that or any preceding week. The time allowed for registering a birth is forty-two days, and for a death five days, but there appears to be no average period of retardation. Possibly hours of bright sunshine and other conditions of the weather have some influence in determining the period between a death and its registration.

The number of births bears no relationship to the number of marriages in a limited locality, as special churches are favourites; but the birth-rate is to some extent an indication of the social conditions of the population: the lower the birth-rate the larger the proportion of well-to-do persons. Before birth-rates can be used as in any way a measure of the social conditions, they should be corrected for the proportion of young married women as compared with the average of England and Wales, *i.e.*, 170 per 1,000 of all persons. In Bath there were in 1891 only 154 young married women per 1,000 of all ages; it therefore follows that a "factor for correction" 1.105 may be used to multiply our recorded birth-rate in order to compare it with that of England and Wales. The birth-rate of England and Wales in 1898 was 29.4, that for Bath 19.07, or, corrected, 21.03. The difference between the birth-rates in Bath and in other large towns is not due only to the smaller proportion of young married women, but also to other social causes, the absence of the improvident classes, etc.

Even when we have made every possible correction, we are still only able to compare vital statistics of one community with another community; we are not comparing the sanitary conditions of localities. Because the inhabitants of one town boast of a death-rate of 10 per 1,000 annually, another town with a death-rate of 20 per 1,000 annually may be no less healthy to live in. The death-rate may be a measure of the average sanitary condition of the whole population of a town; it means little to an individual provided the circumstances of the individual remain the same. Occupation and

education, the capability of providing large rooms, good food and attention for children and old persons, have, in my opinion, far more influence on the death-rate than any circumstance connected with locality of English towns. The public, however, very generally regard vital statistics as representing the condition of places rather than as vital statistics.

In studying local statistics, it is so easy to confuse cause and effect. So many persons come to live in a place because they think it suits their "constitution"; the residence is so often the result of any disease they may have, not the disease of the residence they have chosen. Probably the majority of those persons at present living in Bath were not born in that city; the census returns of 1891 show that not two-thirds of our population were persons born in Somersetshire. But notwithstanding the floating character of our population, we may get some information concerning the influence of locality and climate upon the prevalence of disease, particularly the diseases of children and those diseases supposed to be associated with particular dwellings.

Some at least of the notifiable diseases might be supposed to be associated with the dwelling, and as the periods of incubation are in all cases known to be only a few days, a floating population would tend to accentuate rather than attenuate the probability of multiple cases occurring in the same house if the house were infectious. In the majority of cases, during non-epidemic years, it is difficult to trace the source of infection; one is led to believe in sporadic cases, *i.e.*, cases which seem to have no connection with any pre-existing case. If it were known that disease organisms flourished in the soil or in the house for years, and only now and again attacked a susceptible person, it would be easy to account for sporadic cases; but sporadic cases ought to be more common in some houses than in others, and so we should get multiple cases in the same house. Examining our returns since the Notification Act has been in force, I am unable to get any evidence of this. Thus, since March 1st, 1890, we have had 1,436 cases of scarlet fever in 1,025 private houses; there were two or more cases in 256 houses, but in all but forty-one houses the second cases occurred in less than two months from the first, and therefore might have been acquired from them. We are dealing with a period of nearly ten years, and a second incidence of scarlet fever only in 4 per cent. of the houses does not point to house infection, especially as disinfection until recently has been very imperfectly carried out, while isolation in hospital has been offered to all.

Diphtheria we certainly have some reason to believe is likely to

be associated with particular districts and houses. During the nine and a half years referred to, we have had 338 cases in 291 houses, and in all but nine the second case could be traced to the first. Our statistics for erysipelas, enteric fever, small-pox, and puerperal fever all teach the same lesson. Infectious diseases (except enteric fever) are generally conveyed by persons, and very seldom by things. Enteric fever we know to be a marked exception to this rule. In

**Infectious Diseases notified in Private Dwellings in Bath,
1890-1899.**

Population, 51,844; Occupied Houses, 8,933—Census, 1891.

NUMBER OF HOUSES IN WHICH ONE OR MORE CASES OF NOTIFIABLE INFECTIOUS
DISEASES HAVE OCCURRED SINCE 1890.

Number of Cases per House.	Scarlet Fever, Houses.	Diphtheria, Houses.	Erysipelas, Houses.	Enteric Fever, Houses.	Small-pox, Houses.	Puerperal Fever, Houses.
1	769	258	281	100	7	14
2	164	21	12	8	2	—
3	56	10	2	—	1	—
4	20	2	—	—	—	—
5	12	—	—	—	—	—
6	1	—	—	—	—	—
7	1	—	—	1	—	—
8	1	—	—	—	—	—
9	—	—	—	—	—	—
10	1	—	—	—	—	—

the tables given above I have excluded schools and public institutions, and I cannot say how much their cases might have influenced my results if they could have been distributed to the private houses. Our infectious disease hospital is not in the city, and, except a few cases of diphtheria, no infectious person would be intentionally admitted to any other institution excepting persons suffering from enteric fever who are brought from the rural districts around Bath. The following are the total numbers of notifications received from public institutions and not included in my statistics:

Mineral Water Hospital: Scarlet fever, 7; erysipelas, 4; diphtheria, 2 cases.

Royal United Hospital: Scarlet fever, 29; erysipelas, 34; enteric fever, 14; diphtheria, 6.

Workhouse: Scarlet fever, 34; erysipelas, 95; enteric fever 29; diphtheria, 1; puerperal fever, 1.

Most of the scarlet fever cases were, after notification, removed to the Statutory Hospital on Claverton Down.

In considering more chronic diseases in relation to locality, we have greater difficulties to contend with than when dealing with

* Not including cases notified after admission to public institutions.

diseases due to recent infection. It is very difficult to obtain information for past years concerning the number of persons per house, length of residence, first onset of fatal malady, contributing causes to death and other important details. Hence, probably, statements concerning house incidence of deaths may not be worth much, but I have collected certain facts, and I give them for what they are worth.

I have had a summary made of all deaths in the city of Bath since 1866 for a number of diseases which are supposed to be more common to certain houses than to others. Those for cancer and from all tubercular diseases I have had referred to the dwellings in which the deaths took place, and maps prepared showing the relative number and dates of deaths in each house.

In this manner 1,319 deaths from cancer were referred to 1,212 houses. There were 1,111 houses with one such death, 95 houses with two, and 6 houses in which three deaths from cancer had occurred during the thirty-two years. In no house had four deaths from cancer occurred, as far as we could judge from available information.

During the same period there were 3,529 deaths from various tubercular diseases which I could refer to 2,576 houses. There were 1,813 houses with one death from tuberculosis, 473 with two, 112 with three, 47 with four, 12 with five, 7 with six, and 1 with eight deaths. The house in which eight deaths have been recorded was a tenement house with a probable population of about fifteen persons, or twice the average number.

The figures lead me to look upon cancer as in no way connected with the dwelling, but deaths from tuberculosis are more frequent in certain houses and in groups of houses than we should expect if the incidence of tubercular diseases occurred by chance. But figures of this kind would prove nothing, considering how great is the personal element in liability to tuberculosis, if we did not know by actual experiments that damp, dark, badly-ventilated houses predispose persons to tubercular disease and favour the growth and persistence of the tuberculosis bacillus. We also know that the subsoil has much to do with the prevalence of tubercular disease, but the climate of the subsoil of most localities has been very little studied, and very little is known concerning the influence of meteorological changes upon disease and death. The new treatment of phthisis is a remarkable variation from the old method of coddling consumptive persons.

Dr. Ballard's classical report on summer diarrhoea taught us something of the relationship of earth temperatures to disease, but,

RECENT EXPERIENCES OF DIPHTHERIA.*

By MABYN READ, M.D.,
Medical Officer of Health of Worcester.

UNTIL the science of bacteriology shed light into the dark places, there was much mystery surrounding outbreaks of diphtheria, and even now more knowledge of the life-history of the bacillus has to be gained before we can successfully cope with this insidious and fatal disease. Those of us who are old enough to remember outbreaks of diphtheria fifteen years ago will not forget the puzzling nature of many of the problems presented to us, and all of us can remember how often the treatment was ineffectual and almost hopeless, offering so great a contrast to the splendid results of the anti-toxin serum treatment of to-day.

It was my happy lot to reside for two years (from June, 1881, to June, 1883) at the Hospital for Sick Children, Great Ormond Street. Children suffering from diphtheria were admitted only if in urgent need of tracheotomy, and these were treated in a ward as far removed as possible from the general wards, and had separate nurses. There were also admitted children having paralysis following diphtheria, and these were put in the wards provided for medical cases. During my residence there were two or three outbreaks of sore throats among the children in the latter wards. It was recognised by the medical officers that all varieties of sore throats occurred in the same outbreak; some were associated with obvious membrane, others were similar to follicular tonsillitis, and others, again, looked like simple sore throats. These variations in the character and severity of the disease were puzzling, but instructive, and have been partly explained by the discovery of the *Bacillus diphtheriae*; yet even now we do not know why some throats have severe lesions, others slight, or none at all, when all are exposed to the contagion of the disease.

Early in 1884, in my "Thesis for the M.D. Degree," I maintained, on the basis of my experience, that "diphtheria is a contagious systemic disease caused probably by a specific germ." The "Thesis" was accepted by the (then) Regius Professor at Cambridge; but the idea that the disease was due to a specific germ was not acceptable to him, and indeed was not at that time capable of direct proof.

In the medical treatises of those days it was clearly taught that the disease was contagious, and epidemics of it had occurred

* Presidential Address read before the Birmingham and Midland Branch of the Incorporated Society of Medical Officers of Health, October, 1899.

frequently on the Continent, and a peculiarly fatal one raged in some parts of England from 1859 to 1862. Dr. Bristowe, in his "Theory and Practice of Medicine," second edition, 1878, has a full and graphic account of the disease, and mentions that children who have been apparently well of the disease for two or three weeks have occasionally given the disease to others. It was not until 1883 that Klebs described the bacillus observed by him in diphtheritic membranes, and it was some months later that Löffler succeeded in separating it by growth on artificial media.

From the beginning of the year 1891, when I became Medical Officer of Health of the City of Worcester, I have had ample opportunities of studying the disease in all its bearings; for, in addition to the duty of investigating the causation of the disease, I have attended more than 350 cases at the Isolation Hospital. I have visited the houses in which the disease occurred in nearly every case, and have taken notes of the surroundings.

Like so many towns in this country, Worcester seems to have been remarkably free from diphtheria until quite recent years. In the records of the seventeen years 1873 to 1889 there were only forty-three deaths registered as due to diphtheria. In 1890 the Infectious Disease (Notification) Act came into force, and enabled us to know the number of cases that came to the knowledge of the medical men of the city, in addition to the deaths that occur. The record is as follows:

	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899 (9 months).
Cases ...	10	10	27	39	34	26	317	167	185	91
Deaths ...	2	2	11	9	7	7	49	33	29	5

It will be seen that during the six years 1890 to 1895 there was a very moderate amount of this disease, with an average of twenty-four cases and six deaths per annum. During the first five months of 1896, thirty cases were certified, and in June of that year the epidemic began. There had been from the year 1892 a decided increase in the number of cases as compared with the preceding years, and a similar increase had taken place in most of the large urban districts throughout the country.

It is interesting to note that in my report for the first quarter of 1896 the following paragraph occurred:

"In relation to this unusual incidence of diphtheria (sixteen cases in thirteen weeks), it may be mentioned that there has been during the quarter a widespread epidemic of follicular tonsillitis which has certainly been of an infectious nature, and has been looked upon by some of the medical men as a form of epidemic

influenza chiefly attacking the throat. In several of these cases swabs of the throat were taken, and the bacteriological examination showed that the *Bacillus diphtheriae* was absent, except in two instances."

This observation, made some two months before the epidemic of diphtheria commenced, will recall to your minds the well-known theory which Sir Richard Thorne propounded to the Epidemiological Society of London in 1878—that under certain conditions the infectiveness of sore throats appears to be a matter of progressive development from simple sore throat to pronounced diphtheria.

The epidemic lasted in an acute form for six months, and less severely for five months longer. The disease then lay dormant for four months, revived in September, 1897, and continued until July, 1898, since which time it has been endemic and milder in character. Such features in the epidemic as I think worth bringing to your notice will be mentioned in the succeeding paragraphs.

The city of Worcester has a population of 44,000. The soil of the old part of the city is alluvial gravel and sand, the hillsides being of a red marl.

It is entirely a water-closet town, there being only a few houses, mostly in the outskirts, with privy accommodation.

The water-supply is from the Severn, carefully filtered through sand, and pumped to all parts, the pipes being constantly full. There are very few wells remaining, and none in the central nor in the new parts of the city. The rainfall for the twenty years from 1877 to 1896 averaged 25·15 inches per annum; but there was an average of 8 inches less per annum in the second decade than in the first. The Severn is only 30 feet above sea-level at Worcester Bridge, and most of the city is less than 100 feet above sea-level; this causes a humid atmosphere, and a good deal of autumn and winter fog.

Perhaps these physical conditions are the cause of the large number of unhealthy throats which undoubtedly exist among the children, and form an excellent culture-medium for bacteria.

Besides the knowledge of the life and behaviour of disease-germs under various conditions, bacteriology, and the pathology associated with it, have taught us the great importance of maintaining the glandular organs of the fauces in a healthy and active state, for under such conditions disease-germs are more likely to find a grave than a breeding-ground that satisfies their every want.

As before mentioned, Worcester is a town sewered throughout; but, owing to the contours of the land, the gradients of some of the main sewers are less than could be wished. A great proportion

of the branch sewers have flushing-tanks, which are used weekly. The ventilation is chiefly by surface-grids, and here and there by shafts. There are the usual complaints of malodours, generally well founded.

It is a remarkable fact that during the very period in which the sanitation of our towns has so vastly improved diphtheria has increased in them, and from being a rural disease has become an urban. This has been attributed by some to the greater energy shown during the last ten years in enforcing attendance at the elementary schools. Dr. Newsholme, in his book on "Epidemic Diphtheria," has, however, pointed out that in many large cities on the Continent where school attendance has been compulsory for fifty years there was no increase in the disease until 1880, and the very great increase since that date has not been associated with any more compulsion as regards school attendance.

Every medical officer of health who has personally investigated outbreaks of diphtheria is well aware of the great influence the aggregation of children in schools has on the spread of the disease. As regards my own experience, I would say that this has been the preponderating feature up to the present time. During the past three and three-quarter years, 760 cases of diphtheria have been certified; of these, 559—74 per cent. of the total—were children between the ages of three and fifteen (that is, had completed their third and fourteenth years respectively). Nor does this express the full truth, for a good proportion of the children under three years were infected by older children in the family who attended school, and the same holds good of some of those over fourteen years.

A marked example of the school influence was shown during the first half of 1898 in the contiguous parishes of St. John and St. Clement, which are situated on the west side of the Severn, and thus detached from the rest of the city. St. John's parish has about 4,700 inhabitants, and 698 children on the schools' registers; St. Clement's parish has a population of about 2,100, with 573 children on the registers. The population of the latter parish is poorer, not so well housed, and under less favourable sanitary conditions than that of the former. At the end of February, 1898, cases of diphtheria began to occur among the children attending the infant school of St. John's, and soon the girls' school was also invaded. All the parish schools were closed on March 7th, and remained so until April 18th, a period of six weeks. The disease lingered on in the parish until the end of July. During all these months not a single case of diphtheria was certified from the adjoining parish of St. Clement.

Respecting the distribution of the disease as regards age and sex, the epidemic showed no unusual features, and the following table gives the facts :

Table showing number of cases of Diphtheria Certified from January 1st, 1896, to September 30th, 1899, and Deaths during same period.

	Under 1 year.	1-2 years.	2-3 years.	3-4 years.	4-5 years.	Total under 5 years.	5-10 years.	10-15 years.	15-20 years.	Over 20 years.	Total.
Males ...	3	16	20	34	21	94	114	47	18	20	293
Deaths ...	3	7	5	10	6	31	17	—	—	—	48
Females ...	3	15	19	41	42	120	176	84	24	63	467
Deaths ...	1	8	4	12	11	36	23	6	—	1	66
Total ...	6	31	39	75	63	214	290	131	42	83	760
Deaths ...	4	15	9	22	17	67	40	6	—	1	114

Males were 38.5 per cent. of total with a fatality rate of 16.4 per cent.
Females were 61.5 per cent. of total with a fatality rate of 14.1 per cent.

Of the total number the fatality rate was 15 per cent.
Of those under 5 years of age the fatality rate was 31.3 per cent.
Of those over 5 years of age the fatality rate was 8.6 per cent.

Let us now turn to the preventive measures, and first among them is school closure. It has been my practice to promptly visit a school which is threatened with diphtheria. In two instances I spent much time in calling day by day at the houses of children absent from school to ascertain the cause. In many cases the absentees had sore throats. If no medical man was in attendance, I asked to be allowed to examine the child's throat, and this was always granted. In two or three days I was by this means able to gauge the probability of an epidemic in the school, and took measures accordingly. From the first I advised the school teachers to send home all cases of sore throat, and gave them a list of those I had suspicions of, from visiting, promising in all instances a certificate under Article 101* of the Education Code. In both cases referred to I advised closure of the school, although only three or four cases of diphtheria had been certified, and I was justified, inasmuch as during the week following closure several cases of diphtheria occurred, and after that time no more.

When a school is closed, information of the fact is sent to the neighbouring schools, and a letter to the Sunday-school managers, acquainting them with the circumstances, and asking them to aid

the Sanitary Authority by keeping their schools closed during the same period. This request has always been readily complied with, and the action is a necessary corollary if the full effect of closure of the day-schools is to be gained.

In October, 1898, a conference was held between the Members of the School Board, the Managers of the Voluntary Schools, and the Health Committee, and resulted in the drawing up of the following regulations :

CITY OF WORCESTER.

REGULATIONS RESPECTING INFECTIOUS DISEASES IN THE ELEMENTARY SCHOOLS.

Scholars who have been attacked by

Scarlet Fever	to be kept from school for 8 weeks.
Diphtheria	" " " 8 "
Whooping Cough	" " " 8 "
Measles	" " " 4 "

N.B.—Unless in any particular instance a medical man certifies that some shorter or longer period of isolation is necessary.

Scholars who have been exposed to infection from

Scarlet Fever	to be kept from school for 10-14 days.
Diphtheria	" " " 12 "
Whooping Cough	" " " 21 "
Measles	" " " 16-21 "

dating from last day of exposure.

Printed forms (stamped) are supplied on which the Masters and Mistresses may send to the Health Office the names and addresses of all scholars suspected or known to be suffering from

MEASLES OR WHOOPING COUGH.

When a child enters a school the parent should be asked if the child has been vaccinated, and a list should be carefully kept with the full name and address of every child NOT VACCINATED.

These and the printed forms mentioned came into use at the beginning of this year, and have been found very useful. On my part I promised a liberal use of Article 101*, which is most soothing to the school authorities, as the absence of the child does not result in loss of money by reducing the average number. I think you will agree with me that if these regulations are carried out with discretion the sanitary authority will receive great help and at a very small cost.

The greatest difficulties in dealing with diphtheria and sore throats are found in the infant schools. I have been assured so often by mothers that the small children who are found to have well-marked diphtheria made no complaint about their throats, and continued to take their food as usual, that I believe it to be a clinical fact worth noting. Also in these infants there is very little constitutional disturbance, and until the toxic symptoms occur a

not too observant parent would never think of serious disease in the child. From a clinical point of view, and speaking generally, in the early stages of the disease the younger the child the less is pain complained of, the less is the swelling of the fauces, and the smaller is the amount of constitutional disturbance. Then, too, so little information can be gained by questioning the children at the infant schools, and to examine their throats in the school is almost out of the question.

The Health Committee caused bills to be posted throughout the City, a proceeding to my mind of doubtful value, and leaflets similar to that given above were distributed to the children in the schools affected, to take home to their parents. This latter method was distinctly useful, and induced a greater degree of carefulness on the part of both parents and school teachers. It is only right for me to acknowledge the ready help I received from the school authorities whenever I visited the schools, and through all their troubles the relations between us have been most friendly.

Lastly, we have removed to hospital for isolation and treatment as many as possible of the cases. Until April, 1898, our hospital accommodation was limited, but in that month our new hospital was ready for use. Of the total of 760 cases, 357 were isolated in hospital. Diphtheria is a disease which, when not in the severer forms, can be successfully isolated at home, provided the isolation begins early, is continued long enough, say four weeks, and intelligent care is taken. It is a much easier disease to isolate than scarlet fever, for instance. But the severe forms need skilled nursing, and many lives have been saved, I feel sure, by removal to hospital. In nearly every instance the patient has been kept in the hospital until the bacteriologist has reported that he has been unable to find the diphtheria bacillus in the cultures made from the swab sent him. The average time taken to get the fauces free from the bacillus has been from four to five weeks. In a few instances I have been obliged to send the child home without this assurance after a stay in hospital of perhaps eight weeks, but the disease has never been given to anyone at the home.

In connection with this you will pardon me, I hope, if I speak briefly of the use of antitoxin serum. The splendid results that have followed the adoption of this treatment have been amply demonstrated in the statistics published by the Medical Superintendents of the London (Asylums Board) Fever Hospitals, and many others in all parts of the world. But recently a veteran in our own branch of medical work has spoken so strongly on the employment of sera in the treatment of various infectious diseases,

saying "that it cannot be proved that one single life has been saved" by these methods, that I feel I may be excused for stating the results of my experience.

At the commencement of 1895 I began the use of antitoxin serum in the treatment of diphtheria, at first cautiously, then with increasing boldness. During the last three and three-quarter years I have treated more than 350 patients, and all of them with the serum; the mild cases had a moderate dose of 2,000 units, the severer ones about 12,000 units. Throughout I have used the serum sent from the Jenner Institute. The drawbacks are comparatively trivial, and speedily yield to treatment.

Had I my choice between the whole list of drugs and local applications on the one hand, and antitoxin serum on the other, I should choose the serum—not, of course, that I neglect the help of the materia medica. As in other parts of this address, I am giving my experience, and not labouring to prove this or that point; and so I shall not trouble you with statistics which would all be drawn from years during which the serum has been in use, but the fatality rate of the 760 cases was but 1.5 per cent., which is a very moderate one for the disease. I cannot understand how any person who treated the disease years ago, and now has the aid of the antitoxin, can be anything but delighted with the results of its use. A severe case of diphtheria was most distressing to treat, painful to the patient, most trying to the nurse, and taxed the whole resources of the medical man. How different is the picture to-day! The prick of the needle gives but temporary pain; there is no need to fight with the child every hour to swab its throat, and in forty-eight hours convalescence is well set in, if the case be seen early enough, *i.e.*, before the fourth day of illness.

The use of antitoxin as a prophylactic I have had little experience of, but that little has been favourable. It is said that the protection afforded does not extend beyond three weeks.

Probably we are all hampered in the same way in endeavouring to realize our ideals in the work of preventive medicine. Most frequently the cost of better and more complete measures for prevention is the bar to their adoption. I feel strongly that it is necessary to convince the ratepayers of the good that will result to the community from this or that suggested reform.

The rapid increase of general scientific knowledge is greatly in favour of preventive medicine, and we may confidently look forward to the time when our paths will be made more smooth, though probably the increasing complexities of our communal life will create new difficulties to be surmounted.

DIPHTHERIA IN RURAL DISTRICTS.*

By EDWARD BULLER HICKS, S.R.C.P.,

Medical Officer of Health of Easingwold Rural Sanitary District.

THE increase of diphtheria in the large centres of population, notwithstanding the decline of other contagious diseases, makes its study unusually attractive to the sanitarian of to-day. My experience of it is entirely as a disease of rural districts, and I shall say little that is not the outcome of that experience. I do not propose to make any attempt to bewilder you with figures, nor have I any bacteriological research to place before you. I hope, however, that some of my facts will not be devoid of interest, and that any discussion on what may be deduced from them will not prove altogether unprofitable to ourselves, or valueless to the public. In the main, I shall restrict myself to the last ten years of my observations, and an annual report of mine, that for 1889, a year of epidemic diphtheria in my district, will be largely drawn upon and utilized. I may say that for many years previous to this I had opportunities of observing diphtheria in the sporadic form throughout the length and breadth of a district of 70,208 acres, containing a population of 10,504, but that it never appeared in epidemic form, with one notable exception, when quite a number of children died from membranous croup, some of them under my own care. It was quite a new experience to me, but I remember at the time I considered them to be cases of diphtheritic laryngitis. One, and only one, recovered, and as the laryngeal symptoms subsided a tough membrane appeared upon the usual surface in the fauces, separating about the ninth day in the usual manner. In 1889 I had an opportunity of seeing epidemic diphtheria in a regular and severe form amongst a population just under 2,000 inhabitants.

It was not so much the number of cases I had under observation as the severity of the illness that attracted attention, for there were not, all told, more than thirty attacks, but of these eleven were fatal. I believe we should have had a much larger number of cases and a heavier mortality except for the wholesome dread the disease inspired, and the care that was taken against exposure to infection. With respect to its incidence, my report says that it formed no exception to the rule that the incidence of diphtheria is greatest between the ages of two and ten. Six of the deaths occurred in children under five years of age, whilst the remaining five took

* Read before the Yorkshire Branch of the Incorporated Society of Medical Officers of Health, December, 1899.

place at ages under six years (two), and at eight, nine, and ten years respectively. School attendance, which is generally supposed to have a close connection with its spread, does not appear to have had causal relationship with the disease. I mention in that report what I still believe to be true—that I have long been struck with the part febrile and inflammatory conditions play in the propagation of diphtheria: that is to say, I believe numbers of children would not contract the disease unless under the influence of febrile disorder or local inflammatory conditions. At the time of this particular epidemic there was a serious block both of the east and west sections of drainage, there being actual overflow of sewage in the east section where the disease originated, and the block of all the branch drainage above that in the main sewer must have been great, and as a matter of fact highly offensive emanations from branch drainage were notoriously widespread.

My conclusions as to the cause of this outbreak were as follows: That the outbreak had a close connection with insanitary drainage, and that drinking water highly unfit to be used as such may have contributed to its development. That where cubic space was small, and especially where this defect was associated with house-damp and insanitary conditions, there the communicability of the disease was greatest, and the mortality also great. Meteorologically, hot days in May and June, intensifying insanitary ground conditions, and cold winds, giving rise to catarrhs, predisposing the subjects of them to contract diphtheria, appeared to be operative.

In November, 1890, my sanitary authority adopted notification, and since that time up to date my notifications of diphtheria have numbered 155 for the whole district. In Easingwold itself I have had thirty-five notifications, and in a village two and a half miles away twenty-five. In January, 1897, diphtheria had again become epidemic in Easingwold, there being four deaths from it. Since that period—i.e., after the fourth death—all the cases I have had an opportunity of seeing have been treated by serum. They number up to the time I write forty-five, many of them being severe cases, a large proportion having abundant, rapidly-growing membrane, with infiltration of neck after the second day, and pronounced constitutional disturbance.

In every case except one the effects of serum treatment were all that its warmest advocates have claimed for it. The particular case which forms the exception was thought at first not to be a case of diphtheria, but one of septic tonsillitis, there being huge tonsillar swelling (one-sided), and, at first, no membrane. There was enormous swelling of the neck externally when I saw the case in consultation, so

establishes a *prima-facie* case against them of causal relationship, with its potency for mischief.

[Although school attendance was closely connected with the spread of diphtheria, the Author contended that this was not always the case, and that a more comprehensive view should be taken of its origin and development.]

THE ASSOCIATION OF SCARLATINA WITH DIPHTHERIA.—Chabade (*Arch. Russes de Pathol.*, 1899, p. 208) examined bacteriologically the throats of 214 cases of scarlatina observed in the Hospital Petropavlovsk, St. Petersburg, from December, 1897, to September, 1898. Of these, 98 had a catarrhal angina, characterized by a simple redness of the mucous membrane, without false membrane; 33 had a lacunar angina, the false membrane covering only the crypts of the tonsils; and 83 showed a true pseudo-membranous angina, with more or less extensive false membrane upon the tonsils, and sometimes even upon the pillars of the fauces, uvula, soft palate, and posterior wall of the pharynx. In the first group of cases cultures revealed the presence only of streptococci, sometimes associated with staphylococci, but never with bacilli of diphtheria. In the second group the Klebs-Löffler germ was found in only two cases, once in almost a pure culture. In the third group the diphtheria bacillus was found in eleven instances—three times in nearly pure culture, and eight times with streptococci. The question is raised, in view of the occasional presence of the Klebs-Löffler bacillus in the throats of persons in good health, whether, in the cases in which this germ was found by Chabade, it did not exist purely accidentally, without participating in the evolution of the morbid process. This view, however, seems untenable when it is considered that several times the bacilli were found in almost pure culture, and even when associated with streptococci were always very numerous. A second argument in favour of the virulence of the bacillus in these cases lies in the fact that in the cases in which it was found the mortality was higher than in the cases in which the streptococcus alone existed: in 103 cases of the latter the mortality was 38 per cent., while of the thirteen cases of angina with the diphtheria bacillus, eight, or 62 per cent., terminated in death. Another fact attesting the virulence of the bacillus was the occurrence of a fatal croup in a child, aged one year, who, with a typical scarlatina, showed a true diphtheritic pseudo-membranous angina. Finally, the author studied twenty-four cases of so-called late or secondary angina, which appeared in from twelve to forty-one days after the beginning of the scarlatina, six cases being lacunar and eighteen pseudo-membranous. The presence of the Klebs-Löffler bacillus was proven in two cases of the first category (once in pure culture), and sixteen of the second (eleven times to the exclusion of all other microbes). He therefore holds that the secondary anginas of scarlet fever are most frequently diphtheritic in nature. Chabade concludes that patients showing a mixed infection should be isolated from cases of pure scarlatina, and to this end he recommends the bacteriological examination of all patients showing false membrane. In accord with the practice of many others, he advises that such mixed infections be treated with the anti-diphtheritic serum.—*American Journal of Medical Science*.

DIPHTHERIA EXPERIENCE IN KEIGHLEY IN 1898.*

By W. SCATTERTY, M.A., M.D.,

Medical Officer of Health of Keighley.

I FEEL I ought to apologize to this Society for presuming to occupy its time with a short history of an epidemic of diphtheria in the borough of Keighley during the greater part of last year. Your energetic Secretary thought, however, that the following short statement might serve as an introduction to an interesting discussion on diphtheria, especially in relation to public health.

For several years the number of cases reported in Keighley has been steadily decreasing, but last year was marked by one of the most serious epidemics which have visited the borough. The cases notified annually since the Notification Act was adopted in 1891 numbered 62, 36, 31, 34, 19, 16, 13, 12, and 149.

On January 9th, 1898, a case of diphtheria was reported from Utley, and during the next few days seven other cases were notified, all being children attending one class in Utley Board School. The precautionary measures to be mentioned later were adopted, with the result that no further cases were reported from this neighbourhood.

On January 22nd, however, a case was notified from Holycroft Board School, which I may mention is attended by over 1,000 children. From this fresh focus nearly seventy children in the junior department were infected. The same measures for checking the spread of infection were adopted as in the Utley outbreak, but the cases being spread over a larger and more populous district, less success attended our efforts.

Towards the end of February the infant school was closed for two weeks, and during this period no case was reported. A recrudescence of the disease followed the reopening of the school, and not until the beginning of April, when both the infant and junior departments were closed, was there any decrease in the number of cases notified. It is interesting to note that during the month these departments were closed only one case connected with Holycroft was reported. When the schools were again opened, it became evident, from the fresh cases reported, that the epidemic had not yet been stamped out, and consequently the schools were closed until after the summer holidays, or for such longer period as might be found necessary.

* Read before the Yorkshire Branch of the Incorporated Society of Medical Officers of Health, December, 1899.

half of 1897, nearly all being from the northern half of the district. The outbreak continued into the next year, and began to spread into the southern half, and doubtless there would have been many cases there also had it not been for the prompt action of the medical officer. Dr. Windle grasped the essential fact that it was through the mild and unrecognised cases that infection spread, and was able to induce his authority to permit him to make use of the bacteriological test. He also persuaded the sanitary authority and school board to hold a conference, and joint action in reference to the schools was agreed upon, one of the arrangements being that the children should be examined twice a week by himself and another medical man. "It is impossible," Dr. Windle affirms, "to speak too highly of the benefits which have accrued from this systematic examination of the school-children in stamping out the disease." The average attendance at the schools in his district is about 1,300, and at first sight it would appear an almost impossible undertaking to examine this number of children twice a week, with private practice demanding attention as well. It was, however, found that two days a week gave ample time. The outfit was simple, a spatula, a solution of 1 in 1,000 bichloride to disinfect it, clean towels, and throat swabs for bacterial examination of suspicious cases. The fauces of each child was examined, a quick survey was then made of the hands and neck for desquamation and of the nose and ears for discharge. Every child with sore throat, however slight, was excluded from school, as although many were not diphtheritic in their nature, yet such throats were in a condition eminently favourable for the growth of the diphtheria organism. Sore throat of a non-diphtheritic type was found to be very prevalent.

Dr. Windle, in reviewing all the circumstances of the outbreak, adduces the following facts to show the influence of school-life as the chief factor in the spread of this disease:

- (a) The cases were almost entirely confined to households of persons whose children were scholars at the public schools.
- (b) In a large proportion of the invaded houses the *first* individual to be attacked was a scholar at one of the infected schools.
- (c) Adults and children below school-age were found to be proportionately rarely affected in the first instance, and when such cases occurred it was common to get a history of previous throat illness among school attendants in the same family.
- (d) Children living in better-class houses and not attending elementary schools showed a remarkable exemption from attack.

It is much to be desired that the Local Government Board should obtain from all districts weekly returns of cases of disease notified to the medical officers, and now that notification is universal much valuable information might accrue therefrom. We know that diphtheria spreads slowly across a country along the lines of personal communication, and the authorities might be warned when it was found that a wave of the disease was approaching. The simile is not altogether inapt; we see diphtheria like a tidal wave running into certain places rapidly, in others creeping in slowly; and as some places round our coasts have a second tide a few hours after high water, so we get subsidiary outbreaks of diphtheria after the disease had apparently left a district for another. A survey of the reports of Dr. Johnstone and Dr. Windle, together with the record of deaths as published by the Registrar-General, appears to show that a diphtheria wave passed westwards from London, invading Isleworth, in the last quarter of 1896, passing thence to Hillingdon in Uxbridge rural, whence it spread into Uxbridge urban district by the end of 1897, and returned to Hayes, which is off the main road, and somewhat distant from the railway. From Uxbridge it would not be difficult for the disease to spread northwards to Denham, and south-westwards to the other places in the Eton rural district. The disease appears to have been prevalent in the Wycombe registration area in the early part of 1896, and it is possible that Uxbridge may have been affected therefrom. But the Wycombe prevalence would appear to be the result of a previous wave, else Uxbridge urban district and adjoining parts would have been attacked earlier. A proper appreciation of the course of such waves can, however, only be obtained through weekly notification by every local authority to the Local Government Board, and the prompt publication of the information so received.

ANALYSIS OF WATER AND SEWAGE.—Dr. Barwise's "Practical Hints," which appeared as supplements to the issues of this Journal of July and August last, have been reprinted in booklet form, and can be obtained from the publishers of the Journal. Price 2s. 6d.

ENTERIC FEVER AT THE FRONT.—It is clear that there is a considerable prevalence of this disease at Ladysmith and elsewhere. We cannot understand how this should be, having regard to the facility and certainty of purification by filters, such as the Pasteur-Berkefeld, which are capable of rendering harmless almost any class of water. The present is not the time for inquiry, but the question will have to be faced later on, and the blame, if any be due, laid on the proper shoulders. Small-pox has been practically eradicated among our troops, and we fail to see why enteric fever (and dysentery) cannot be so too.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

A MEETING of the Society was held at No. 197, High Holborn, London, on Friday, January 12th, 1900. Present: Dr. A. Newsholme (President), in the Chair, Drs. R. Dudfield, W. Gruggen, J. Groves, W. H. Symons, E. F. Willoughby, T. Ridley Bailey, Walter C. C. Pakes, J. Scott Tew, Edward Seaton, W. J. Simpson, S. Barwise, George Newman, J. F. J. Sykes, T. M. Legge, D. L. Thomas, H. Beale Collins, J. Robertson, F. Argles, J. J. Eyre, and F. J. Allan, Members of the Incorporated Society, and Miss H. Louise Billett, Drs. G. H. Graham, G. L. Eastes, and K. W. Coadly, Visitors.

MINUTES.—The minutes of the last ordinary meeting were read, and having been approved, were signed by the President.

REPORT OF COUNCIL.—The HON. SECRETARY submitted the report of Council as follows:

Your Council beg to report—

1. That they have received the following letter from the Local Government Board on the subject of the payment by local authorities for the voluntary notification of phthisis:

"Local Government Board,

"Whitehall, S.W.,

"December 18th, 1899.

"SIR,

"I am directed by the Local Government Board to advert to your letter received on the 22nd ultimo, inquiring whether the Board's auditors will raise any objection to the payment by sanitary authorities of fees for the voluntary notification of phthisis.

"In reply, I am to state it rests with the district auditor, in the first instance, to decide upon the legality of any particular payment. The Board cannot undertake to say what course would be adopted by a district auditor in regard to any particular charge which it might be his duty to review. I am, however, to state that in the Board's opinion local authorities have power, under the provisions of the Public Health Act, 1875, to make reasonable payments in respect of the notification of cases of infectious disease occurring in their districts.

"I am, sir,

"Your obedient servant,

(Signed) "JOHN LITHBY,

"Assistant Secretary.

"F. J. Allan, Esq."

2. That they have received a letter from the Honorary Solicitor intimating that in his opinion the Society may legally advance a portion of its funds as a temporary loan to the Sanitary Inspectors' Examination Board, and that consequent thereon, and in pursuance of the resolution reported at the last meeting, your Council have advanced the sum of £50.

3. That they have received and adopted a report from the Finance Committee—

(a) Intimating that the Committee have heard with much regret of the illness of their Chairman, Dr. Gwynn, and of the

Treasurer, Dr. W. H. Kempster, and recommending that letters of sympathy should be forwarded to them.

(b) Reporting the payment of various outstanding accounts.

4. That they have received and adopted the following report from the Parliamentary Bills Committee:

Your Committee beg to report that they have considered the draft Bill entitled "Sanitary Officers (Officers of Health) Bill, 1900," prepared by the British Medical Association, that they have examined that Bill clause by clause, and that they have decided to submit the following proposals for the consideration of the Council of the Incorporated Society in preference to attempting to redraft the Bill submitted to the Committee.

Your Committee are of opinion—

1. That the title of the Bill should be "Medical Officers of Health and Sanitary Inspectors Bill, 1900."
2. That the provisions relating to tenure of office should take effect from the date of introduction of the Bill into Parliament, and should apply to existing officers as well as those appointed or reappointed subsequent to that date.
3. That the local authorities should be required to make the prescribed deductions from the salaries of the officers affected, and to pay such deductions into the central fund.
4. That the scales of deductions should be those mentioned in the draft Bill.
5. That there should be no return of deductions made under the Bill to an officer losing his appointment in consequence of fraud or misconduct.
6. That the Local Government Board should form and administer the central superannuation fund.
7. That as regards all appointments and reappointments made subsequent to the introduction of the Bill into Parliament, no officer should be allowed to contract himself out of the provisions of the Bill.
8. That the Bill (*mutatis mutandis*) should apply where practicable to medical officers of health and sanitary inspectors holding office in Scotland and Ireland.
9. In respect of all other details not referred to in this report, the Committee approve of the Bill as drafted.

Your Committee have also had before them the Public Health and Local Government Conference Act, 1885, by which provision is made for paying the expenses of the *clerks* of local sanitary authorities attending conferences, but makes no such provision for medical officers of health and other officers, who are therefore precluded from obtaining payment of expenses when attending congresses and conferences. Your Committee having learned that district auditors have disallowed such expenses, and that certain sanitary authorities are now only appointing delegates subject to their agreeing to refund the amount allowed for expenses in the event of the district auditor surcharging the same, recommend—

That the Council should take the necessary steps to secure the amendment of the Act in this respect, and that the matter be referred back to the Parliamentary Bills Committee for this purpose.

Your Council recommend that the foregoing report be approved and adopted.

Dr. ANDERSON read a paper on the "Causes of Summer Diarrhoea."

A discussion followed, in which the President and Drs. Vacher, Wilkinson, and Berry took part.

It was resolved that the discussion be adjourned until the February meeting, when Drs. Wilkinson, Berry, and Harris will continue it.

The meeting terminated with a vote of thanks to the reader of the paper.

Yorkshire Branch.—A meeting of the Branch was held at Huddersfield on Friday, December 15th, 1899. There were present Dr. Fairclough (President), in the Chair, and Drs. Ainley (Halifax), Annis (Huddersfield), Hicks (Easingwold), Martin (Brighouse), Mussen (Huddersfield), Ramsden (Saddleworth), Sellers (Thornhill), Stuart (Batley), Thorp (Holmfirth), and J. B. Kaye, hon. secretary (Wakefield).

The Mayor of Huddersfield (Alderman Hellowell) was also present during part of the meeting.

Dr. W. J. Forbes, M.O.H. for Knaresborough Rural, was elected a member of the Society.

The following papers were read:

"Serum-therapy in Relation to Public Health."* Dr. E. G. ANNIS, M.O.H. Huddersfield.

"Diphtheria in Rural Districts."† Dr. E. B. HICKS, M.O.H., Easingwold.

"Diphtheria Experience in Keighley."‡ Dr. W. SCATTERTY, M.O.H., Keighley.

After some congratulatory remarks upon the papers, it was considered advisable to postpone further discussion until the next meeting.

Refreshments were provided by the Mayor.

Dr. FAIRCLOUGH (the President) proposed a vote of thanks to the Corporation for their kindness in having allowed the medical officers to visit the Sanatorium, and also for the use of the Council-room, in which the meeting was held.

Dr. HICKS seconded the resolution, and it was passed unanimously.

It was acknowledged by Alderman WOODHEAD, Chairman of the Finance Committee; Alderman JESSOP, Chairman of the Health Committee; and the Mayor.

It was proposed to hold the next meeting at Halifax, and to continue the discussion upon the above papers.

MEETINGS FOR FEBRUARY.

February 8th, West of England and South Wales Branch, probably at Trowbridge.

February 9th, Incorporated Society, in London.

February 15th, Home Counties Branch, at Holborn Restaurant, London.

February 16th, Southern Branch, at Portsmouth.

February 17th, Scottish Branch, at Glasgow.

* Will be published in a future issue.

† See p. 354 of this issue.

‡ See p. 359 of this issue.

REVIEW OF RECENT BACTERIOLOGY.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.—A very excellent report on the clinical, bacteriological, and general pathological aspects of this disease has been drawn up by W. T. Councilman, F. B. Mallory, and J. H. Wright.* A short historical account is first given of the chief recorded epidemics of cerebro-spinal meningitis occurring before the outbreak of 1896 and 1897 in Boston. A detailed clinical account is then given of 111 cases which were observed in the last-named epidemic, after which the bacteriology of the disease is discussed. A post-mortem examination was made in thirty-five of these cases, and in all but four certain diplococci were found, either in cultures, or on microscopic examination of the cerebro-spinal exudation, or in sections of the tissues. In one of the cases in which this diplococcus was not found after death, it had been identified during life in fluid withdrawn by spinal puncture.† The other three cases were clinically of a chronic nature, and in one of them tubercular infection was also present. The diplococcus isolated in these cases was identified with *Diplococcus intracellularis meningitidis* first described by Weichselbaum,‡ and the following description is given of it. It occurred as a micrococcus, of much the same size as the common pyogenic cocci, arranged in pairs. In cultures short chains of four or six organisms were sometimes found. It was decolorized by Gram's method of staining. On artificial media, generally, growth was rather scanty. The best growth was obtained on Löffler's horse-serum. Glycerine-agar produced a more profuse growth than plain nutrient agar. Growth in bouillon was very scanty. No visible growth occurred on potato, nor was any change produced in litmus milk. The pathogenic action of the organism for lower animals was found to be rather less severe than previous investigators had described it as being. In rabbits and guinea-pigs subcutaneous inoculations gave no result. Inoculation into the pleural or peritoneal cavity was followed by a slight "fibrino-purulent" exudation, in which pus-cells containing large numbers of the diplococci were found. Inoculation of the spinal canal produced a typical meningitis in a goat. It will be seen that this diplococcus resembles in some ways the gonococcus of Neisser, which has been described as a rare cause of meningitis; but the bacteriological diagnosis between the two organisms may, as Foulerton§ has pointed out, be readily made by either cultures on artificial media, or by animal inoculations. In patients dead from epidemic cerebro-spinal meningitis the diplococci are almost invariably found in the interior of poly-nuclear leucocytes, and sometimes in very large numbers. In no case were the cocci found anywhere except in the special lesions of the disease; attempts to obtain cultures from the blood of the general circulation, or from the liver, spleen, or kidneys, always failed.

* *Epidemic Cerebro-Spinal Meningitis and its Relation to other forms of Meningitis.* A Report of the State Board of Health of Massachusetts. Boston, 1898.

† *Vide Review of Recent Bacteriology.* PUBLIC HEALTH, vol. xii. p. 239 (December, 1899).

‡ *Fortschritte d. Med.*, 1887.

§ *Transactions of British Institute of Preventive Medicine.* First Series, 1897.

THE BACTERIOLOGY OF YELLOW FEVER.—Sanarelli* has made a final reply to those of his critics, and especially to Dr. Sternberg, who have questioned the ætiological significance of *B. icteroides* found in cases of yellow fever. Sanarelli considers that the report of the Commission of Medical Officers appointed by the President of the United States to investigate the cause of yellow fever has so far confirmed his own statements that any discussion as to the specific pathogenicity of this bacillus can no longer be continued. Sanarelli, however, in concluding the discussion, lays down the following propositions as fully proved: (1) That the *B. icteroides* is found in patients with yellow fever, and in those who have died of the disease; (2) that the *B. icteroides* can be isolated from practically every case of yellow fever; (3) that the *B. icteroides* has been found in yellow fever, and has never yet been found in any other disease; (4) that the serum from 93 per cent. of patients with yellow fever causes an agglutination of *B. icteroides*, whereas this agglutinative reaction is not given by the serum from patients with other diseases; (5) that the *B. icteroides* produces in lower animals, and especially in dogs, a well-marked acute fatty degeneration of the liver.

THE BACTERIOLOGY OF MEAT-POISONING.—Hermant† gives the results of an investigation into an outbreak of meat-poisoning which occurred at Sirault (Hainaut) between August 20th and 27th, 1898. The cause of the outbreak was traced to the eating of "pressed head" and fresh sausages made from the carcase of a certain pig. About 100 individuals were affected, and three of these died. The illness had in the majority of cases an acute onset, with headache, nausea, vomiting, cramps in the abdomen, diarrhoea, and the general symptoms of acute gastro-enteritis. The duration of the illness was usually about eight days; convalescence was slow, and characterized by the persistence of general weakness, some patients not having recovered by the end of three or four weeks. During the acute stages cutaneous lesions—urticaria and labio-nasal herpes—were observed in some of the cases. Post-mortem examination in the fatal cases showed the presence of an acute gastro-enteritis. A bacillus which caused enteritis in animals was isolated from the suspected meat. Cultures of this bacillus were agglutinated by the blood of a patient after recovery from the illness, and also by the blood of a rabbit which had been inoculated with an emulsion of the spleen from one of the fatal cases. Herman believes that his bacillus is identical with that isolated by Van Ermengem in connection with an outbreak of meat-poisoning at Moorseele in 1893, and by Gaffky and Paak in the outbreak which occurred at Röhsdorf in 1890. This bacillus is held to be closely akin to, if not identical with, that described by Gärtner as the cause of a number of cases of meat-poisoning in Saxony in 1888. Recent contributions to the literature of meat-poisoning caused by Gärtner's bacillus (*B. enteritidis*) in this country have been made by Durham‡ and Barber.§

SERUM DIAGNOSIS IN TUBERCULOSIS.—Knopf, in a communication to the New York County Medical Association,|| gives the results of experi-

* *The Medical News* (New York), December 9th, 1899, vol. lxxv., No. 24.

† *Archives de Méd. Expériment. et d'Anatomie Pathologique*, 1^{re} série, tome xi., No. 4, 1899.

‡ *British Medical Journal*, December 17th, 1898; and *Transactions of Pathological Society*, London, May 16th, 1899.

§ *British Medical Journal*, November 11th, 1899.

|| *Medical Record* (New York), December 9th, 1899, vol. lvi., No. 24.

ments carried out in the Health Department Laboratory of New York in order to ascertain the practicability of serum diagnosis in tuberculosis. Pleuritic fluid from a tuberculous guinea-pig, used in the proportion of one part of the serum to nine parts of an emulsion of the specific bacillus, caused a well-marked agglutinative reaction. But the results of the test in clinical practice were not quite so satisfactory. Thus the serum from eight patients with pulmonary tuberculosis was tested; in four cases a good reaction was obtained, in two cases the reaction was only slight, in one case it was doubtful, and in one case it was negative. Further experiments were made, and Knopf came to the conclusion that under present conditions the test cannot be considered as of any great value. It is, however, highly probable that after further study and trial of the technique the method may prove of considerable assistance in clinical diagnosis.

SEPTIC TANK SEWAGE TREATMENT.—As the result of an investigation of the septic tank system, extending over two years, by a special committee, the silver medal of the Sanitary Institute has been awarded to the Septic Tank Syndicate, Limited, for the "septic tank as an appliance for the hydrolysis of suspended organic matters in sewage and the reduction of sewage sludge."

DIARRHŒA—POSSIBLE CONNECTION WITH MILK.—In a public institution in Marylebone an outbreak of some feverish disorder, accompanied with diarrhoea, occurred in October last. The number of cases was ten, all adults. The patients consumed the larger quantity of unboiled milk, the staff the smaller, but the staff had probably individually a larger proportion of milk than the patients. The patients in one ward only suffered slightly, the staff more severely. The milk, being suspected, was subsequently sterilized, and no fresh cases occurred. The milk, chemically, was first-class; but Mr. Meredith Wynter Blyth, on making a bacteriological examination, found an organism possessing the characters of the *B. enteritidis*, which organism has, on the authority of Dr. Klein, F.R.S., an intimate relation with diarrhoea. A second sample, taken on delivery, was forwarded for bacteriological examination to the Jenner Institute. The report was as follows: "Bacteriological examination showed the presence of the *B. enteritidis sporogenes* (Klein), and members of the colon group of bacteria. A guinea-pig, inoculated with 2 c.c. of the milk, died in three days with an acute infection. From all parts of the animal—seat of inoculation, spleen, and blood—an organism was obtained in large numbers and in pure culture. This organism possessed all the characters of the *B. enteritidis*. Outbreaks of gastro-enteritis have been attributed to the *B. enteritidis*, and it is quite probable that the organism was the cause of the present outbreak." The vendor of the milk stated that it came from a farm near Aylesbury, the amount being 49 gallons in seven churns. Each churn has an attached warranty label that it is "pure unskimmed milk." The same milk was supplied to two other large institutions. On inquiry at these institutions no evidence of ill-effect from the milk was ascertained.—*Sanitary Chronicles of Marylebone*.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

BEFORE DARLING AND CHANNELL, JJ.

December 18th, 1899.

WELSH V. MAYOR, etc., OF WEST HAM.

This was an appeal by case stated from a conviction by the deputy stipendiary magistrate of West Ham. An information was laid by the respondents against the appellants for that, having been convicted on November 30th, 1898, of an offence committed on September 3rd, 1898, against one of the bye-laws of the borough relating to buildings, they did continue such offence for eighty-five days after written notice, contrary to Section 158 of the Public Health Act, 1875. The bye-law was one providing for a sufficiency of air space about buildings to secure a free circulation of air. The appellants were builders, and in 1898 they rebuilt for the Commercial Brewery Company (Limited) the Dewdrop Inn, Arkwright Street, in the borough of West Ham. The conviction on November 30th, 1898, was admitted, but it was stated that after that date the appellants had not been in possession of the premises, and had no right, power, or authority to go upon them. The premises remained in the same condition as on September 3rd, 1898, and as on the date of the conviction. The notice given by the respondents, who were the urban authority, was served on the appellants on January 20th, 1899. The magistrate held that the existing of the building in the condition above stated was a continuing offence, and convicted the appellants. Section 158 of the Public Health Act, 1875, after providing that an urban authority may, after notice, pull down any building not erected in accordance with their bye-laws, enacts that: "Where an urban authority may under this section pull down or remove any work begun or executed in contravention of any bye-law, or where the beginning or execution of the work is an offence in respect whereof the offender is liable in respect of any bye-law to a penalty, the existence of the work during its continuance in such a form and state as to be in contravention of the bye-law shall be deemed to be a continuing offence, but a penalty shall not be incurred in respect thereof after the expiration of one year from the day when the offence was committed or the bye-law was broken." The appellants' contention was that they could not be convicted of a continuing offence inasmuch as they were not owners of the premises and could not comply with the respondents' notice without committing a trespass" (*Marshall v. Smith*, L.R., 8 C.P., 416; *Rumball v. Schmidt*, 8 Q.B.D., 603; *Reay v. Mayor, etc., of Gateshead*, 55 L.T., 92, and *Smith v. Legg*, 1893, 1 Q.B., 398, were cited.

Boydell Houghton for the appellants; and *Gwynne James (Asquith, Q.C., with him)* for the respondents.

Mr. JUSTICE DARLING said that if the building was put up in contravention of the Act the local authority might have ordered it to be pulled down. The statute went on to say that if the building remained in that condition there was a continuing offence. The question was, Who

committed the continuing offence? The builders, the appellants in this case, had done wrong in the first instance, and had been convicted for it; but before the notice in respect of which these proceedings were taken was served they had gone away, and had nothing more to do with the building. The local authority had it in their own hands to put an end to the offence either by pulling the building down or by proceeding against the person or persons who really continued the offence. The statute did not say that the person who first committed the offence was responsible for its continuance. Such a person was responsible for his own misfeasance; but it did not follow that another person might not be responsible for continuing the offence. That person need not be the original builder.

Mr. JUSTICE CHANNELL said that he was of the same opinion. The latter part of Section 158 was introduced to meet the case of *Marshall v. Smith*, in which it was held that suffering a wall built in contravention of a bye-law to remain unaltered was not a "continuing offence." As the offence was building the wall, not pulling it down was not a continuance of the offence. The question was, Who is the person guilty of the continuing offence in this case? The Act might have said that the original builder was the person guilty. The Court were asked to assume that the Act meant this because the section limited the penalties to one year. His Lordship, however, thought that the reasonable meaning of the section was that the person who was liable for the continuing offence was the person who actually continued it. If the local authority could not find out who that person was so much the worse for them. The Act, at all events, provided (in Section 306) machinery for discovering the owner. There was nothing in the Act which obliged their Lordships to hold that there was here a continuing offence by the person or persons who originally erected the building. In *Reay v. Mayor, etc., of Gateshead* Mr. Justice Hawkins was reported to have used language which justified the decision of the learned magistrate. The words attributed to him were, "If the section had been passed before *Marshall v. Smith* there would have been no doubt at all that the penalties there would have been properly imposed." But having regard to the actual decision in *Marshall v. Smith* this language was inaccurate and might have been incorrectly reported.

Appeal allowed.

BEFORE GRANTHAM AND CHANNELL, JJ.

Thursday, January 11th, 1900.

THE QUEEN V. MEAD (METROPOLITAN POLICE MAGISTRATE).

In this case, heard before a Divisional Court, cause was shown against a rule calling upon the magistrate to state a case. On July 17th last Dr. Thomas, Medical Officer of Health for Limehouse, seized 117 tubs of strawberries which he found in a van proceeding along Devonport Street, and applied to the magistrate for an order under Section 47 of the Public Health (London) Act, 1891, condemning them on the ground that they were unfit for the food of man. The magistrate refused to make the order upon the ground that there was no evidence that they were intended for the food of man. The information laid by Dr. Thomas, Mr. Sextus Van Os, the consignee of the strawberries, and Charles Willock, the carman, stated that the strawberries were unsound, and that they were part of a consignment shipped by Mr. Van Namen from

Rotterdam to Mr. Van Os's order. On being advised of the arrival of the strawberries in England, Mr. Van Os gave instructions to a carman to collect them at Bishopsgate Street Station, and to take them to John Moirs, Limited, of Brook Street, Ratcliff, to sell them. Mr. Van Os stated that he had seen the 117 tubs, and, having examined them, he found that they were unsound and unfit for food, and consented to their being destroyed. Willock, the carman, stated that the strawberries were refused by John Moirs, Limited, and that the seizure took place afterwards. Section 47 of the Act, so far as it is material, is:

"(1) Any medical officer of health or sanitary inspector may at all reasonable times enter any premises and inspect and examine . . . (b) any article, whether solid or liquid, intended for the food of man, and sold or exposed for sale, or deposited in any place for the purpose of sale or of preparation for sale, the proof that the same was not exposed or deposited for any such purpose, or was not intended for the food of man, resting with the person charged; and if any such article appears to such medical officer or inspector to be diseased, unsound, or unwholesome, or unfit for the food of man, he may seize and carry away the same himself, or by an assistant, in order to have the same dealt with by a justice. (2) If it appears to a justice that any . . . article which has been seized or is liable to be seized under this section is diseased, or unsound, or unwholesome, or unfit for the food of man, he shall condemn the same and order it to be destroyed."

H. Sutton, who showed cause, contended that the magistrate was justified in finding that at the time the strawberries were seized they were not intended for the food of man.

L. D. Muir, in support of the rule, said that a condemnation order was a condition precedent to taking out a summons against the owner of the article, and contended that all the magistrate had to do upon the application for a condemnation order was to satisfy himself that the article in question was unfit for the food of man, and that it was not until a summons had been issued that he had jurisdiction to inquire whether the article was intended for the food of man or not. This was a point of law, and the magistrate was bound to state a case for the opinion of the High Court upon it.

Sutton, again heard, contended that the suggested point of law was too clear for argument, the magistrate having, on the words of the section, no jurisdiction to condemn the article unless it was an article intended for the food of man.

Rule absolute.

COUNTY OF LONDON SESSIONS.

BEFORE MR. LOVELAND LOVELAND, Q.C., DEPUTY-CHAIRMAN.

Thursday, January 18th, 1900.

Augustus Finsler and Henry Wheeler surrendered to their bail to answer an indictment for having had a quantity of raspberries found in their possession, intended for the food of man, which were unsound and unfit for the food of man. Mr. Biron (with him Mr. Ivory) appeared for the prosecution on behalf of the Vestry of Bermondsey; Mr. George Elliott and Mr. Layman were for the defence. This was the last of a series of cases tried at this and other Courts, arising out of the seizure of different consignments of fruit at Lipton and Co.'s and other factories during the hot weather of last summer. On the afternoon of July 14th

Mr. Thomas, Sanitary Inspector of Bermondsey, was at Lipton's Jam Factory in Rouel Road, Bermondsey, examining other fruit, when a consignment of 250 tubs of raspberries arrived from the railway, having been sent over from Holland the night before. These were taken into Lipton's premises by Mr. Thomas's order, and were examined and seized by him as being bad. The next day they were taken before Mr. Slade, the police magistrate, and were condemned by him. The goods never having been in the possession of Lipton and Co., no proceedings were taken against them, but this prosecution was commenced against the present defendants, who were a firm of wholesale fruit brokers, carrying on business in the City. Apparently their only connection with the fruit was that they were the London agents of the grower in Holland, whose contract with Lipton and Co. had been effected through them. The only witness called at the police court to prove their part in the transaction was Mr. Light, Lipton's manager, and it was now stated that that gentleman was suffering from influenza and unable to be present. At the close of the case for the prosecution Mr. Elliott said he had several expert witnesses to call to prove that the raspberries were perfectly good at the time they were seized, but he took the preliminary objection that there was no evidence to go to the jury that the fruit was ever in the possession of the defendants. Mr. Loveland upheld this objection, and by his direction the jury acquitted the defendants, and they were discharged.

REVIEW.

THE LAW RELATING TO INFECTIOUS DISEASES AND HOSPITALS. H. H. Copnall, Solicitor, Deputy Clerk and Clerk of Committees of the Wilts County Council. pp. 296. Hadden, Best and Co., 1899. This work, the writer states in a footnote on the first page of the introduction, is not intended to apply to London, hence the work is of no value to those who are engaged in carrying on sanitary work under the Public Health (London) Act, 1891. This is much to be regretted.

The book contains an introduction, an annotated collection of sections of various statutes, more or less germane to the subject, memoranda and orders of the Local Government Board, and a digest of decided cases, the latter being conveniently arranged in alphabetical subject order. It is a pity the writer has not consulted the columns of PUBLIC HEALTH with reference to some of the reported cases, as if that had been done fuller information and the names of cases might have been ascertained and made available for general information. A table of cases would have rendered the digest more easy of reference.

The work shows evidence of a considerable amount of labour having been expended on its preparation, and the manner in which the annotations are introduced renders it intelligible in the hands not only of lawyers, but also of laymen, while the reproduction of the Interpretation Act, 1889, will do much to clear up doubtful points in the minds of those who consult it.

We have no hesitation in saying that it is a work that should be at the disposal of the officers of every sanitary authority.

OBITUARY.

WILLIAM NEALOR THURSFIELD, M.D. EDIN., D.P.H. CAMB.,
Medical Officer of Health of County of Shropshire.

Obit. December 19, 1899, et. 59.

Accounts of Dr. Thursfield's life have already appeared in the medical papers, and but few details need be here introduced. Dr. Thursfield's connection with sanitary work dated from the year 1873, when he gave up a successful practice in Wellington to become medical officer of health of a large combined district in Shropshire; he gradually extended his bounds till more than thirty sanitary authorities in seven counties had appointed him as their medical officer. It was impossible, of course, that one man, however energetic, could supervise such an immense area, and Dr. Thursfield had constantly one or more assistants. He was happy in the selection of his assistants, and many, now holding responsible positions in the health world, look back with feelings of gratitude to his teaching and example.

In 1897 the County Council of Shropshire chose him to serve at large the county he had so faithfully served in detail, and it was the hope of all who knew him that in the freedom and comparative leisure of such a position he would be able to give to the world the results of his exceptional experience. But this was not to be; ataxic symptoms had already shown themselves, and, rapidly developing, finally ended in bulbar paralysis a short two years after his appointment.

Dr. Thursfield was a man of remarkable mental power and sound judgment. His published works, though not numerous, are still valuable. They are the result of sound experience carefully and logically considered. He was among the first to point out, in the year 1876, the influence of the Education Acts on the spread of infectious disease among school children, and in 1878 he enunciated in the *Lancet* his view that there existed the closest connection between soil dampness and diphtheria. He pointed out that diphtheria tended to hang about damp houses, and while he showed that the severity of type was much increased by the use of polluted water and the general absence of cleanliness, he protested strongly against the then very prevalent idea that the disease could be originated *de novo* by filth. In connection with the present views as to the wide diffusion of the diphtheria bacillus, it is interesting to note that in the same paper he complained that too much attention was paid to the pathological features of the disease, so that many medical men hesitated to diagnose "diphtheria" unless the membrane or "diphthera" was present, and pointed out that if only the influence of the name could be removed, more cases would be reported and proper attention paid to their infectivity.

Dr. Thursfield was very much interested in the subject of goitre; his only contribution to the literature is a paper in the *Lancet* of 1885, but he had the materials for a large work on the disease. He once had occasion to investigate an outbreak of epidemic goitre among some school children in one of his districts, and it is not too much to

say that he knew the history of every case in the immense area of which he had charge—an area, moreover, celebrated in many parts for the endemic prevalence of the disease. It is impossible in this short space to give anything like a clear abstract of his views, but it may be noted that, according to his own statement, he would never have considered the influence of water as a cause had he been able to approach the subject with a mind unprejudiced by the generally expressed ideas. He preferred a physical explanation, and brought forward many interesting facts in support of his belief.

Other works are "Plain Directions for the Prevention of the Spread of Epidemic and Infectious Disease," "On Cow's Milk as a Vehicle for the Spread of Epidemic and Infectious Diseases," and "On Deaths of Mothers in Childbed considered as Preventable Mortality."

Of his unpublished work it is difficult to speak; the suggestions in his earliest reports would stand to-day in spite of all that has been since written and said on sanitation. In person or by means of his assistants he investigated every case of infectious disease which occurred in any of his districts, and when we reflect that he had careful notes of nearly 3,000 cases of enteric fever alone, most of which were sporadic cases, or represented limited outbreaks, we can only regret that he was called away so early from the field of his labours.

Dr. Thursfield was a man of the most kindly and tactful nature, upright in his dealings with all, and, though reserved and shy, a firm and welcome friend to those who knew him. He was widely read, and possessed a marvellous memory, together with a great fund of humour. He literally lived for his work; even when his disease was upon him, his sense of duty refused him that rest which it was the wish of all he should take, and this devotion undoubtedly hastened the end. On whatever grounds of private feeling we mourn his loss, on whatever grounds of public weal we deplore the unfinished tale of bricks, we cannot regret the example he has left behind.

PARLIAMENTARY PUBLICATIONS.

To be obtained from Messrs. Eyre and Spottiswoode, East Harding Street, Fetter Lane, E.C.

REPORT ON THE GENERAL SANITARY CIRCUMSTANCES AND ADMINISTRATION OF THE CHORLEY RURAL DISTRICT. By Dr. F. St. George Mivart. Price 3d.

REPORT ON THE PREVALENCE OF DIPHTHERIA AND ENTERIC FEVER IN THE BIGGLESWADE RURAL DISTRICT. By Dr. F. St. George Mivart. Price 9d.

REPORT (FINAL) OF THE ROYAL COMMISSION ON WATER SUPPLY OF THE METROPOLIS, WITH INDEX TO FIRST AND FINAL REPORTS OF THE COMMISSION. Price 9d.

APPOINTMENTS.

Alexander, J. D., L.R.C.P. Edin., appointed M.O.H. of Porthcawl Rural Sanitary District.

Anningson, B., M.D. Cantab., M.R.C.S., reappointed M.O.H. of the Borough of Cambridge.

Coles, A. C., M.D., reappointed M.O.H. of Denton Urban Sanitary District.

Goodall, J. K., *L.R.C.P., L.R.C.S. Edin.*, reappointed M.O.H. for the Health Sanitary District of the Chesterfield Union.

Johnson, P., *L.R.C.P., L.R.C.S. Edin., L.F.P.S. Glasg.*, appointed M.O.H. of the Borough of Stoke-on-Trent.

Jones, T. O., *L.R.C.P., L.R.C.S. Edin., L.F.P.S. Glasg.*, reappointed M.O.H. of the Ruthin Rural Sanitary District.

Jones, Charles Sturges, *M.R.C.S. Eng., L.S.A.*, reappointed M.O.H. of the Borough of Chichester.

Liddle, P. H., *M.B.*, appointed M.O.H. of the Shire of Huntley, Victoria.

Reed, W. H., *M.R.C.S.*, reappointed M.O.H. of the Westbury and Whorwells-down Rural Sanitary District.

Scatliff, A. W., *L.R.C.P., D.P.H.*, reappointed M.O.H. of the Margate Urban Sanitary District.

Slader, G. W. B., *L.R.C.S.*, reappointed M.O.H. of the Gainsborough Rural Sanitary District.

Shepherd, J., *L.R.C.P. Lond., M.R.C.S.*, reappointed M.O.H. of the North Walsham Urban Sanitary District.

Saxby, T. Edmonston, *L.R.C.P., L.R.C.S.E.*, etc., appointed M.O.H. of the District of Unst, Shetland, N.B.

Wood, W. D., *L.R.C.P.*, re-appointed M.O.H. of the Henley Urban Sanitary District.

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EDITORIAL.

CENSUS BILL, 1900.

THE Bill for the census of next year was introduced into the House of Commons, read for the first time, and ordered to be printed, on the 19th of last month. The changes which may be made in the measure during its passage through the two Houses may effect radical alterations, but it seems desirable to call attention to certain of the proposals, and more particularly to the variations from the Act of 1890 which we have noted in the hasty examination which has been possible. One great feature is the omission of details which come under the definition of "office management," so that the Registrar-General will have greater freedom of action than was the case at the last census.

The date of the census proposed in the Bill, which is to apply to Scotland as well as to England, is March 31st, the day recommended by the Incorporated Society of Medical Officers of Health as well as by the Royal Statistical Society. In the Act of 1890 the Local Government Board was directed to prepare the requisite forms; in the present Bill that work is entrusted to the Registrar-General, an alteration which may perhaps be regarded as technical only. The information to be obtained is prescribed by clause 4, sub-clause 1:

- (a) the name, sex, age, profession or occupation, condition as to marriage, relation to head of family, birth-place, and (where the person was born abroad) nationality of every living person who abode in every house on the night of the census day; and
- (b) whether any person who so abode was blind or deaf and dumb, or imbecile or lunatic; and
- (c) where the occupier is in occupation of less than five rooms, the number of rooms occupied by him; and
- (d) in the case of Wales or the county of Monmouth, whether any person who so abode (being of three years of age or upwards) speaks English only or Welsh only, or both English and Welsh.

There will presumably, therefore, be no attempt to obtain a return of the religions of the inhabitants. If it could be done without creating dangerous complications, it would be desirable, in the case of those born abroad, to obtain information as to the numbers of those who are English by nationality, and to distinguish naturalized British subjects from foreigners. In dealing with occupation, it is to be hoped that some means will be found to obtain more reliable information as to employers and employed.

In defining a "dwelling house," the term "story" is omitted and "tenement" is used instead. This agrees much more closely with common usage, but there will, we fear, still remain the difficulty as to what is a "house." The following sub-clause (5) of clause 4, relating to the householder's duty as to filling the schedule, is new:

(5) For the purposes of this section, a person who is travelling or at work on the night of the census day, and who returns to a house on the morning of the following day, shall be treated as abiding in that house on the night of the census day.

Such person would therefore be included in his "home" schedule, and unless special care be taken, it seems likely that this provision may lead to error, having regard to the provisions of clause 7:

7. The Registrar-General shall, subject to the approval of the Local Government Board, obtain returns of the particulars required by this Act with respect to persons who during the night of the census day were travelling or on shipboard, or for any other reason were not abiding on that night in any house of which account is to be taken by the enumerators, and shall include these returns in the abstracts to be made under this Act.

Taking the two clauses together, there appears to be a serious risk that a certain proportion of persons will be enumerated twice over.

Section 7 of the Act of 1890 directed the enumerator to take account of "the inhabited houses, and of houses then building and therefore uninhabited, and of all other uninhabited houses within his division." Sub-clause 2 of clause 5 of the Bill does not refer to houses in the course of erection, but contemplates a distinction between "unoccupied" and "uninhabited" houses. The clause is here set out:

(2) Every enumerator shall also furnish the prescribed particulars as to whether or not houses are occupied or inhabited, and as to the counties, boroughs, parishes, and other areas for electoral or administrative purposes, and the ecclesiastical parishes or districts, in which the houses are situated.

The Bill does not prescribe how the enumeration districts are to be formed, a duty which the Act of 1890 laid on the registrar of each sub-district, subject to revision by the superintendent registrar and the Registrar-General. The latter Office is to issue instructions

under this head for the next census, and it may be possible, therefore, to persuade him to allow medical officers of health to have something to say in the formation of such districts. The direction to the enumerators to transcribe the schedules into the enumeration books is also omitted, it being left to the Registrar-General to draw up such directions as he deems requisite for preparing for tabulation the information contained in the schedules. We would strongly recommend the use of cards in lieu of books.

The desire of medical officers of health, and other local officials, to obtain information in addition to that contained in the published returns is met by the following clause:

9. The Registrar-General may, if he thinks fit, at the request and cost of the council of any county, borough, or urban district, cause abstracts to be prepared containing statistical information with respect to the county, borough, or district which can be derived from the census returns but is not supplied by the census report, and which, in his opinion, the council may reasonably require.

If that officer can see his way to supplying such information at an early date and (more particularly) at a reasonable cost, we venture to think that he will obtain a sum which will prove useful towards reducing the total cost of the census. In connection with this clause it will be interesting to quote the following sub-clause of clause 11:

(3) If any person employed in taking the census communicates, without lawful authority, any information acquired in the course of his employment, he shall be guilty of a breach of official trust within the meaning of the Official Secret Act, 1889, and that Act shall apply accordingly.

This will, we fear, effectually put an end to the courtesies which were extended in certain districts in 1891 by the registrars to the medical officers of health.

In Scotland the following additional information is to be provided for in the schedule:

Clause 12. (3) The schedules under this Act shall include particulars showing whether any person who abode in any house on the night of the census day (being three years of age or upwards) speaks English only or Gaelic only, or both English and Gaelic:

(4) The particulars to be furnished by the enumerators shall show, with respect to each dwelling-house, the number of rooms, including a kitchen (if any) as a room, having a window, not being a window with a borrowed light.

For the issue of the preliminary return, a period of five months is proposed, but none is suggested for the final reports. We think this should be amended. If it be inadvisable to fix a limit for the issue of the whole of the final returns, we think that certain of them, *e.g.*, statistics as to sex and age, should be published within

(say) one year of the census day, the remainder to follow at later dates.

The success of the census largely depends on the class of men obtained for the enumeration. Just now the Government may naturally be expected to be unwilling to spend more than is barely necessary on a census, but fortunately the bulk of the expenditure will come in the financial year 1901-1902, so perhaps it may be possible to have the purse opened somewhat wider. We also hope that some return will be published giving an account of the statistics of the British Empire as a whole, which would be a fitting acknowledgment of the loyalty and imperial unity manifested by England's sons at the present juncture.

Doubtless there are many matters of importance and interest which we have not dealt with here. We shall be glad to receive criticisms and suggestions from our readers for use in a future issue.

CONCERNING THE USE OF MEAT FROM DISEASED ANIMALS.—Dr. Fritz Basenau (*Archiv für Hygiene*, xxxii., 219) makes some recommendations which may have some economic importance. A certain group of diseases seems especially liable to render meat injurious, but an animal slaughtered on account of sickness is not necessarily unfit for food, especially if the food be not eaten raw. Ordinary macroscopic examination will not show whether any infection resides in the meat itself, but bacteriological and feeding experiments will determine whether it may be used. He recommends that in case an animal is slaughtered while sick and it is desired to use the flesh as food, the bacteriological examination be begun within twenty-four hours, during which interval any organisms present will probably multiply. In healthy animals no bacteria are found within the muscles even after long keeping. At the time of starting the bacteriological examination feeding experiments should be begun also, mice being fed upon the raw meat, and others with meat that has been kept at the temperature of boiling water for an hour. If no colonies are observed in twenty-four hours, and no bacteria are demonstrated by the microscope, the meat is good. If colonies are produced, reliance must then be placed on the feeding experiments. If the mice fed on raw meat die and the others survive, the inference is that the meat may be cooked and eaten; if both sets die, the meat may not be used as food. Basenau examined the meat of a number of cattle that had suffered from various septic processes, and found it to be more or less rich in bacteria. The diseases included chronic pyæmia, septicæmia cryptogenetica, abscessus lienis traumaticus, paralytic puerperal fever, and perforation peritonitis. The bacteria found approach closely his *Bacillus bovis morificans*, but with some differences: all killed mice used in feeding experiments quickly even the boiling temperature. In all probability these bacteria are pathogenic to man, for they resemble or are identical with the bacteria which have been isolated as the exciting cause in different outbreaks of meat-poisoning.—*American Journal of Medical Science*.

THE APPLICATION OF BACTERIOLOGY TO PUBLIC HEALTH.*

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THE subject of bacteriology is of great interest to the medical officer of health both on theoretical and on practical grounds. Many medical men, whilst knowing nothing of bacteriology as a science, make use of the methods which have been devised by those who do. One does not need to be a Pasteur or a Lister to adopt the aseptic methods which have been the result of their labours, nor does one need to know all the questions concerning spore formation to be enabled to use a "Washington Lyon."

Nowadays, however, many bacteriological investigations are from time to time required in order to elucidate certain facts regarding epidemics, etc. I think that I am right in saying that up to the present time these investigations are either put into the hands of some of the comparatively few bacteriologists, badly done by someone or other who has the merest smattering of bacteriology, or not undertaken at all. A little knowledge is a dangerous thing in Bacteriology, as in many other things, and many of the grossest errors have been committed in her name for which she has been in no wise responsible, and of the two latter alternatives above suggested it appears to me better that the investigation should not be undertaken than that it should be undertaken by those who are not competent to do it.

That bacteriology is recognised as a factor in the science of preventive medicine, public health, sanitary science, or hygiene is evidenced from the fact that it is now included in the curriculum for the Diploma of Public Health, and that most of the examining boards have appointed a special examiner in that subject. I am aware that already bacteriology is so great a subject that there are now two almost distinct branches of it, the pathological and the technical, and that many years' study are necessary to become proficient in either branch; but, on the other hand, those who have attended even the minimum course will at least have learnt how to avoid some of the many pitfalls with which the ground is strewn.

As we all know, there are two bodies of workers whose domains

* Read before the Incorporated Society of Medical Officers of Health, January, 1900.

have been hitherto separate, but who are now coming into contact over bacteriological and other work. Under the Sale of Food and Drugs Acts a body of men known as public analysts are appointed to perform the analyses required by those Acts. It has got to be believed that the analysis of water is the peculiar prerogative of the public analysts, and some of them appear to have got to believe it themselves. Having had so much water analysis to do, they have necessarily become aware of the unsatisfactory results from that analysis alone, and as a consequence have added thereto the bacteriological examination, many knowing nothing of the science.

The Local Government Board insists, and I think rightly, that the public analysts shall be well qualified, and the Institute of Chemistry also rightly brings pressure to bear that none but its fellows shall hold this appointment. Provided that the public analysts content themselves with doing the work for which they are so well qualified, no regulation could be better; but as some of them are now trying to include water analysis and the bacteriological examination of water, milk, butter, etc., and to prevent the medical officer of health from doing this, it is high time that the medical officers should have something to say in the matter.

I am not going to maintain that mistakes will not arise, but I insist that if none but a Fellow of the Institute of Chemistry is to be allowed to do chemical work under the Sale of Food and Drugs Act, none but a Diplomat in Public Health should be recognised as competent to undertake sanitary bacteriology. Even in what they deem their own domain the public analysts are not infallible. One in the witness-box actually declared that he could not conceive that my analysis of a sample of water was correct, because there was less saline than albuminoid ammonia. He further added that he had had thirty years' experience of water analysis, and he had never seen it.

There are many diseases which have now been proved to be associated with certain bacteria. These bacteria have, for the most part, distinct individualities, and can by suitable means be differentiated from other similar bacteria. Unfortunately, it not seldom happens that either the organism is not a typical one, or the text-book descriptions are not sufficiently detailed; in this case it is often very difficult to determine what any organism which we have isolated really is without taking advantage of many more reactions than are commonly used. I shall give examples of this later on.

The examinations which may aid the public health service are those in connection with the diagnosis of diphtheria, enteric fever,

tuberculosis, anthrax, glanders, pneumonia, erysipelas, tetanus, influenza, cholera, and various septic disorders.

As medicine may be divided into curative and preventive, so the bacteriological examination may be either for diagnostic or for preventive purposes. I shall therefore divide my paper into two parts: (1) diagnostic examinations, and (2) preventive examinations.

1. DIAGNOSTIC EXAMINATIONS.

(a) *Tuberculosis*.—Since the day when Koch first clearly demonstrated that tuberculosis was caused by the *Bacillus tuberculosis*, and found that this bacillus had a characteristic staining reaction, the diagnosis of tuberculosis has become much more precise. It has certainly become possible to diagnose phthisis at a much earlier stage by the aid of the microscope than by means of the stethoscope. This fact alone is of very great importance, because everybody admits that in the earlier stages phthisis is quite amenable to environment and treatment.

We can speak of at least three races of the tubercle bacillus—human, bovine, and avian. It is perhaps doubtful whether this last-named is really pathogenic to man, but there is little doubt that human and bovine tubercle are merely varieties differing chiefly in virulence. Theobald Smith* has shown that, at least for guinea-pigs, the bovine tubercle bacillus is distinctly more virulent than the human. This fact does not stand alone in the diseases which are common to man and cattle, for the reverse appears to hold good in the case of small-pox, virus from the cow being less virulent than that from man. This great virulence of bovine *B. tuberculosis* is also of vast importance, because it is children who are the great milk consumers. The young of all animals are, *cet. par.*, more susceptible to bacterial invasion than adults, and therefore we have the conjunction of a more virulent bacterium and a more susceptible subject.

The peculiar staining reaction of the *B. tuberculosis*—the difficulty with which it takes up the stain, and its power of retaining the stain in spite of treatment with decolourizing agents—appears to be shared with only two other bacteria, *B. lepræ* and *B. smegmæ*. The former is practically unknown in this country; the latter can be, and perhaps often is, mistaken for the true *B. tuberculosis*. It is of far wider distribution than has been supposed, having been found in sputum by both Pappenheim† and A. Fränkel‡ and by

* *Journal of Experimental Medicine*, vol. iii., p. 451.

† *Berlin Klin. Wochenschrift*, 1898, p. 809.

‡ *Ibid.*, 1898, p. 880.

several observers in urine and even in milk. It differs from the *B. tuberculosis* in its pathogenicity, not being pathogenic to guinea-pigs; in its cultural reactions; and, finally, in its failing to resist the decolourizing action of absolute alcohol after being stained with warm carbol-fuchsin.

Several methods of staining have been suggested in order to eliminate the smegma bacillus in the diagnosis of tuberculosis. Perhaps the simplest is merely a modification of the well-known Ziehl-Neelson method. If this method leaves any doubt, then that of Honsell* will certainly clear up any doubt.

Modified Ziehl-Neelson Method.

1. The material (whether it is sputum, pus, milk, or the centrifugalized deposit of urine) should be spread very carefully, so that a not too thin but even film is obtained.
2. The film is then dried in the air, and passed three times through the flame of a Bunsen burner.
3. The preparation is stained for five minutes in hot (60° C.) carbol fuchsin, and washed well with water.
4. Wash in absolute alcohol until every trace of stain which can be removed from the coverslip has been removed, and wash in water.
5. Immerse in 25 per cent. sulphuric acid for about five or six seconds, and again wash in water.
6. Counter-stain for about three seconds in carbol methylene blue, wash, dry, and mount.

Honsell's Method.

1. The film is prepared and stained with warm carbol fuchsin, as in the first method, but after washing in water it is dried.
2. It is then immersed in acid alcohol (Absolute Alcohol 97 per cent., HCl 3 per cent.) for ten minutes and washed with water.
3. Counter-stained for several seconds in equal parts of a saturated alcoholic solution of methylene blue and water, washed in water, dried, and mounted.

I have examined several centrifugalized deposits of urine where staining by the ordinary Ziehl-Neelson method has revealed the presence of organisms, which from this staining reaction might have been mistaken for tubercle bacilli. When, however, the specimens were first decolourized by alcohol these disappeared completely. In one case the urine, passed in the ordinary way, was stained by the ordinary Ziehl-Neelson method, and a fairly large number of bacilli which had retained the stain was present. After decolourizing first with alcohol these all disappeared. A second specimen, drawn off by catheter, failed to reveal these

* *Arbeiten aus dem Path. Anat. Inst. zu Tübingen*, N. V. Baumgarten, Bd. II., 1896, H. 2, p. 317.

bacilli even when not first decolourized with alcohol. Inoculation was without effect upon a guinea-pig.

In milk, too, I have certainly come across bacteria which through imperfect decolourization with alcohol retained the red stain. Subsequent specimens, when thoroughly so decolourized, failed to show any of these.

As we know, therefore, that these smegma bacilli will under certain conditions be evident under the microscope, it behoves us to adopt some such method as above suggested, in order to eliminate the danger of mistaking them for tubercle bacilli. I remember upon one occasion receiving some sputum for examination in which I could find no tubercle bacilli. When I wrote and informed the medical man of this fact, he wrote back to say that it had been examined by two medical men, himself included, and a fair number of tubercle bacilli had been found. I therefore stained a specimen in the manner in which I anticipated that they would have stained it, as well as a second one in the way I always adopt. In the usually stained specimen there was certainly bacilli which might have been mistaken for tubercle bacilli; but in the one previously decolourized with alcohol no such could be found. I sent him the specimens, and at the same time told him how to stain the sputum. He failed to find the red staining bacilli in subsequent specimens.

There are two or three points in connection with the diagnosis of tuberculosis which I should like to emphasize. In early cases of phthisis, when the lesions are very small, and only a few tubercle bacilli are present in the sputum, it sometimes becomes a matter of difficulty to find them. When this is so, the first sputum coughed up after waking should be examined. I have examined several such early cases, and in the "early morning" sputum I have succeeded in finding a few bacilli, when I have been unable to find them in the sputum coughed up later in the day. Secondly, in these very early cases it is essential to be sure that one is really examining material which has come from the lung. It not seldom happens that there is some inflammation of the fauces, which leads to an erosion of the faucial mucous membrane, and a specimen of sputum may consist entirely of squamous epithelial cells and mucus. In such a case it is the rarest thing to find any tubercle bacilli in the specimens.

In examining the urine it is absolutely necessary in nearly every case to submit it to the action of the centrifuge, for it very seldom happens that tubercle bacilli are in sufficiently large numbers to be found without the greatest difficulty in the ordinary urine. If possible, it is best to allow the urine to stand in a cold place free

from dust for a few hours. Any sediment that has formed is then pipetted into the centrifuge-tubes, and well centrifugized for about five minutes. After the process is completed the supernatant fluid may be poured off, and the sediment treated as pus. Whenever possible, it is advisable to examine a catheter specimen, and, as in the case of the sputum, the urine which has collected in the bladder overnight should be drawn off. It is in urine chiefly where the danger of mistaking the smegma bacilli occurs.

In tuberculosis of the intestines it is sometimes possible to find the bacilli in the faeces. It is practically useless, however, to be satisfied with spreading a little of the faeces, staining, and examining the specimen so obtained. If a very careful inspection of tuberculous faeces be made with the naked eye, small masses consisting of mucus and pus will be found. These masses should be picked out, washed gently in water and then spread upon a coverslip, stained *secundum artem*, and examined. I do not think that it is worth the trouble of examining faeces for tubercle bacilli unless these masses can be found—not because it is impossible that the case can be one of tuberculosis, but because it is impossible to decolourize the faeces without decolourizing any tubercle bacilli which might be present. Out of some twenty-five suspected cases of tuberculous enteritis, I have succeeded in demonstrating the presence of tubercle bacilli in six.

I have mentioned tuberculosis of the genito-urinary and intestinal tracts, because although the urine and faeces are not such important factors in the spread of tuberculosis as the sputum, still, I think that it is possible that they may have some influence, and it is always advisable to eliminate every known source of danger if we wish to prevent infection.

(b) *Diphtheria*.—So much has been written recently upon this subject that I fear I shall be able to give little that is new. As, however, I have had the opportunity of examining cultivations from the throats of close on 3,000 cases, an analysis of my results may be of some interest. In looking over my notes, however, I considered that it would be better to give only those cases which have been examined under comparable circumstances. I shall therefore content myself with giving an account of those cases which I have examined from the out-patient departments and wards of Guy's Hospital.

Since 1894 arrangements have been made so that the doubtful cases of diphtheria may be examined bacteriologically. Several of the wards and the out-patient departments are provided with tin cases containing a sterile swab and a tube of inspissated blood-

serum. From any case which comes into the hospital, whether as an in- or as an out-patient, presenting any suspicion of diphtheritic symptoms, a cultivation is made. In order to avoid any unnecessary delay in the diagnosis, the hospital authorities have placed an incubator in the casualty department, in order that cultivations, taken after the bacteriological laboratory is closed, may be incubated without delay. The cultivations are generally made by the house physicians and house surgeons, and it is they who decide whether there is really any suspicion of diphtheria.

Since 1894, 1,836 cases have been examined. When the routine examinations began, I made a long series of examinations to determine whether it was possible to diagnose the growth by the naked-eye appearances. After making some 200 such observations, I came reluctantly to the conclusion that a naked-eye examination is all but useless. I now rely entirely upon the microscopic appearances of the organisms in stained specimens.

The method of preparing the specimens is as follows: The culture is examined with the naked eye to see if there be present more than one kind of colony. It sometimes happens that there is a very characteristic growth upon the blood-serum, as of the *Staphylococcus pyogenes aureus*, or the *B. subtilis*, or the *B. mesentericus vulgaris*. When this happens all these colonies are avoided, and only the remaining sampled. When there are no such obvious colonies, a fair number of the colonies present are taken off with a platinum spatula and mixed together, and a fair sample of the mixture is spread upon the coverslip.

In the following table it will be seen that I have divided the cases to some extent according to the bacteria discovered. I must admit that this classification is only a rough one, because I have not made observations upon other bacteria than those of diphtheria in many cases where they were undoubtedly present; but I have nearly always made these observations when any organism or organisms were very obvious. For instance, I have often observed organisms which under the microscope showed spores, and which on the blood-serum gave the wrinkled grayish growth so typical of the *B. subtilis*. If, however, there has been a pure culture of staphylococci or streptococci, or there has been a large excess of these, I have noted it.

From the table below it will be seen that, out of a total of 1,836 cases examined, only 343 were found by bacteriological examination to be diphtheritic—i.e., containing the *B. diphtheriae*. This means that only 18.6 per cent. were diphtheritic. At first sight this would appear to be a very small proportion, but it must be remembered

that a very large number of cultures are taken simply with the object of excluding diphtheria, a procedure which the department has always encouraged.

Table of Diphtheria Cases.

Organism found.		Years.				Total.
		1894-96.	1897.	1898.	1899.	
Klebs-Löffler Bacillus.	Present.					
	K.-L. B. ...	74	95	85	35	289
	K.-L. B. and Hoffmann ...	4	10	3	1	18
	K.-L. B. and Str. or Staph. ...	15	16	4	1	36
	Hoffmann ...	20	44	23	2	89
	Hoffmann and Str. or Staph. ...	1	5	4	3	13
	Str. ...	32	39	24	22	117
	Str. and Staph. ...	13	17	5	10	45
	Staph. ...	22	58	59	38	177
	Cocci ...	34	74	48	23	179
	Oidia ...	10	3	7	3	23
	Friedländer ...	2	3	2	1	8
	B. pyocyaneus ...	0	0	1	1	2
	No K.-L. B. ...	84	220	262	225	791
	No growth ...	6	12	5	26	49
Total		317	598	532	391	1,838

It will be seen that I have very carefully divided those cases which showed the Klebs-Löffler bacillus from those which showed Hoffmann's bacillus, and I have had several cases which showed both. In nearly all these cases of double infection subcultures were made, and pure cultivations of each organism obtained, so that I have no doubt as to the presence of each bacillus. In addition, many of the cases which gave only Hoffmann's bacillus were recultivated, and several of the growths were further subcultured, and the pure cultures which I obtained were inoculated into guinea-pigs. In no case have I found such a bacillus to be pathogenic for these animals.

Streptococci are found very frequently in the throats of healthy people. These, however, are the short variety. When I have noted streptococci, they have all presented a sufficiently large number of units to make me believe that they were the long forms. Some I have sub-cultivated, and satisfied myself that they were of the long variety. This organism, as well as the staphylococcus, and also together with the staphylococcus aureus, is very commonly present in the condition known as "septic throat." It is rather strange that the number of cases which showed one or both of these

organisms is within four of the number in which I found the Klebs-Löffler bacillus.

As no test in medicine can be considered infallible, it may be well to consider the value of the bacteriological examination in cases of suspected diphtheria. As many of the cases have come directly under my own observation, and the remainder under the observation of the residents, all of whom I know, I have had the opportunity of following a considerable number throughout their illnesses, and I have been able to verify my diagnosis in many cases.

I take it that it is well accepted that the Klebs-Löffler bacillus is the *causa causans* of diphtheria. If, therefore, a patient is suffering from a sore throat, and this organism is found, I think we are right in assuming that that patient is suffering from diphtheria, and, further, that any patient so diseased is a source of danger to his fellows.

Two opposite kinds of cases have been recorded—one where bacilli, morphologically identical with the Klebs-Löffler bacillus, but not pathogenic, have been found on the throats; and the other where virulent bacilli have been found on normal throats. As regards the first, the cases are few in number, and it appears to me that they prove nothing except that the Klebs-Löffler bacillus may lose its pathogenicity. In order to be able to say that the patient from whose throat they have been derived is not capable of infecting his fellows, it seems to me that it will have to be proved that none of the bacilli there are pathogenic. It is quite conceivable that some of the bacilli in the throat might have decreased, whilst others might have increased in virulence. With regard to the second, this is really nothing unusual, for we must all of us at times have pathogenic bacteria in our bodies without necessarily suffering from the disease which they engender. Because we are not suffering from some form of tuberculosis, does this prove that we have never inhaled virulent bacilli? What is important from the public health point of view is that these people are a great source of danger to their fellows. There is every grade between a healthy throat with bacilli, and the most malignant of attacks. It is well known that often the first attacks in an epidemic are of so mild a nature that they escape detection; nor does it follow that a person infected from a mild case will have a mild attack. One very striking instance of this came under my notice a year or two ago: A young lady had a mild sore throat, so mild that the medical man in attendance treated it very casually. The lady, who had recently become engaged, asked her medical man if she should see her fiancé. He said certainly, because whatever she had got, she had

not got diphtheria. Her fiancé did see her, caught the disease, and died of cardiac failure seventy-two hours after the onset.

Another case was that of a girl of thirteen, who had a mild attack, but who had a persistent discharge from the nose. Some three months after the original attack, two older sisters visited their parents, and, for lack of room, slept with the child. Both got exceedingly virulent attacks of diphtheria; one died of cardiac failure, while the other only just escaped the fatal issue, and had well-marked paralysis.

It has always appeared to me that, since we know that any organism may vary so greatly in virulence and that the patient may be only slightly or very susceptible, and, further, that we can determine the value of neither of these factors beforehand, every doubtful case should be considered as infectious.

What is the value of a negative result—i.e., where we cannot find the Klebs-Löffler bacillus upon the cultivation? Clinically, the throat in a case of diphtheria may exhibit almost anything from a slight reddening of the fauces to a thick tough membrane. Further, other organisms, notably the *Staphylococcus* and *Saccharomyces albicans*, can also produce a membranous exudation. It is practically impossible, therefore, in very many early cases, to say whether the disease is diphtheria or no, and we must rely upon the bacteriological examination. It is very important, then, to know what is the value of a negative result.

(a) The Klebs-Löffler bacillus may be present on the throat, but not found on the culture, because:

1. Other organisms are present which crowd it out.
2. No growth has taken place in the medium.

(b) The Klebs-Löffler bacillus may not be the cause of the condition.

When there is a too good growth of some organism in addition to the Klebs-Löffler bacillus on the blood serum, the latter may really be crowded out. Fortunately, the number of times when such other organism is present is small. In my experience, when most commonly occurring organisms on blood serum inoculated from the throat are streptococci both short and long, staphylococci, other cocci, Hoffmann's bacilli and torulae. Occasionally we find the *B. coli communis*, *mesentericus*, *subtilis*, and other such organisms which are likely to overgrow the medium. If the first-named are present, the Klebs-Löffler bacilli can and do grow alongside them. Experimentally, it is easy to prove that this statement is true by inoculating blood serum with mixtures of these various bacteria. In sixty-seven of the 343 positive cases of my list I have

noted that the culture was a practically pure one of the Klebs-Löffler bacillus, so that, in the majority of the cases, there has been a mixed culture.

If any of the members of the second group are present, the cause of the absence of the Klebs-Löffler bacillus may be that it has really been outgrown, but personally it has been my experience that one very rarely finds this organism in association with the members of this group. If, therefore, the blood serum is seen to be overgrown with a mycoderma or diffuse moist growth, the inability to discover the Klebs-Löffler bacillus helps us in no way, and further cultivations must be taken from the suspected throat.

Occasionally one has a certain amount of doubt about a culture when there is an abundant growth, as sometimes happens, of staphylococci; but as second and third cultures from the throat nearly always result in a repetition of the phenomenon, and as we know that this organism can produce a condition very closely resembling that produced by the Klebs-Löffler bacillus, I think that we may reasonably assume the absence of this bacillus from the throat if we fail to find it on the culture.

There may be no growth on the serum from one of several reasons:

1. An antiseptic may have been used just prior to taking the cultivation.
2. The serum may not have been really inoculated.
3. The serum may be too old, and so too dry.

The first of these alternatives may appear absurd, but I can assure you that it is not. There may be enough antiseptic left on the throat for many minutes after the application to prevent the growth of the bacteria on the serum. In the directions issued by our Department, an interval of two hours is recommended to be allowed to elapse between the application of the antiseptic and taking the culture.

That the serum may not have been properly inoculated I have proved on several occasions. Finding no growth, I have actually inoculated the serum from the swab, and obtained a good growth. In order to be sure that the serum is really inoculated, care should be taken that every portion of the swab should really touch the surface of the medium.

If the serum is old and dry—the last of a batch—then nothing will grow on it. A negative result, because there is no growth on the medium, is therefore of no value whatever.

(b) If the condition is not really set up by the Klebs-Löffler bacillus, but by some other organism, this other organism will most

probably be found upon the serum after inoculation. In my cases I have previously stated that many conditions which are clinically follicular tonsillitis have been examined, and still more with the idea of simply excluding diphtheria. This accounts, not only for the small proportion of true diphtheria, but for the comparatively large proportion of cases where the streptococcus and staphylococcus have been found. The cases where I have found oïdia do not include several cases where stomatitis has been diagnosed, and where I have also found oïdia.

Diphtheria is clinically often difficult to diagnose, on account of the absence of the real diphtheritic membrane. I have asked many practitioners how they would define a membrane so as to cover all cases of diphtheria which have come under their observation. I have not yet received a satisfactory definition. This is not strange, since a patient can undoubtedly have diphtheria without having any signs of the membrane; in fact, perhaps the majority only have an exudation which is sometimes termed a "membranous exudation," but which is often indistinguishable from mucus. One very striking instance of the possibility of having diphtheria without any trace of membrane was that of a student who, having a sore throat, was invalided. As he had been attending two or three cases of diphtheria just previously, a cultivation was taken from his throat, and I was asked to examine it, simply in order to exclude that disease. I reported that the Klebs-Löffler bacillus was present, and I was informed by the Resident, who took the cultivation—a great friend of mine—that it was absurd, because the throat showed no signs of such a disease. A second cultivation was therefore made, and again the Klebs-Löffler bacillus was found. A third cultivation also showed them. Several of the Residents saw him, and all agreed that it was nothing like diphtheria. I was asked what I thought about it, and I said that it was possible, as he was known to have been attending cases of diphtheria, that he had got the bacilli on his throat without having diphtheria; but that if he really had a sore throat, I certainly thought he had diphtheria. On the day upon which the third cultivation was taken, German measles was diagnosed, and he was removed to the fever hospital. There seems to be no doubt that he really had German measles, and it was said in our Gazette that "the disease which had been diagnosed by the bacteriologists as diphtheria turned out to be German measles." About a week after his discharge from the fever hospital, however, he had a slight but quite definite paralysis, thus, I think, proving the correctness of the bacteriological diagnosis.

The micro-organisms which produce conditions of the throat simulating a typical diphtheria are, in my experience, the bacillus of Hoffmann, streptococci, staphylococci, and oïdia.

I am aware that in placing the bacillus of Hoffmann in a group with streptococci and staphylococci, rather than with the Klebs-Löffler bacillus, I am doing something which may be very debatable. Several workers have classed these two organisms together, and consider that the presence of either upon the throat should be sufficient to diagnose the case as one of diphtheria. Two workers claim to have converted Hoffmann's bacilli into Klebs-Löffler bacilli. I do not purpose to go into this question here, but merely to give my own opinions, and some of the facts which have led me to hold these opinions.

1. As regards Hoffmann's bacillus itself, when grown on blood serum for eighteen to twenty-four hours, it can, under the microscope, be differentiated from the Klebs-Löffler bacillus, and although its cultural reactions are in a great measure identical with those of the Klebs-Löffler bacillus, it may be looked upon as a different organism, if only because of its constancy in appearance on blood serum.

2. In the years 1896 and 1897, through the kindness of several of the house surgeons, I had the opportunity of examining many of the throats from which I had obtained Hoffmann's bacilli, and of following the course of the disease. The onus of notifying these cases of course must rest with the medical man who sees them, and as they were not clinically diphtheria, and did not contain the Klebs-Löffler bacilli on their throats (at least, we were not able to find them), they were neither sent to the fever hospital nor notified. The mothers of the children—for the patients were nearly all children—were told that they should keep them from any other children until they were well, and come to the hospital to report progress. In nearly every case the patient had no constitutional symptoms, and the throat was well in two or three days. Now, although we were on the *qui vive*, only one of those kept under observation came back to the hospital after the observation ceased. (Of this case I shall speak later.) I think I may presume that had any of these children developed severe paralysis, they would have come back to the hospital. As none of them did so, I think it is a fair assumption that none of them developed the paralysis. It may be said that, as they only had mild attacks, they would be less liable to paralysis. But this is not so; the mildness of the original attack of diphtheria is no gauge of the chance of paralysis. The case I have quoted above is an example of this. Further, the

most extensive case of paralysis I have ever seen occurred in a boy who, three weeks previous to admission to the hospital, had a slight sore throat, but he both went to school and played about as usual. Another objection is that mothers might not have brought them up, but since the mothers had brought them up for only a mild sore throat, I think it fair to assume that they would have done so for paralysis.

The one exception was somewhat strange. The child had only Hoffmann's bacilli upon its throat at the first examination. As two days later the child was well, no further cultivation was made until ten days later, when it was again brought to the hospital for the same complaint. On this occasion the Klebs-Löffler bacillus was present in conjunction with Hoffmann's bacillus. This, I maintain, was an infection with *B. diphtherie* upon a throat rendered susceptible by a previous infection with Hoffmann's bacillus. It is very unlikely that the first attack was an abortive one, followed later by a true one. If the Hoffmann's bacillus on the throat at the first examination really developed into a Klebs-Löffler bacillus, it is strange that this does not more often occur, because it is by no means rare to find this bacillus on throats which are certainly not diphtheritic, and in patients who do not develop other symptoms of the disease.

3. The specimens of Hoffmann's bacillus which I have isolated from throats have not been pathogenic to guinea-pigs, whereas the Klebs-Löffler bacillus is certainly pathogenic.

4. In my cases are two series of children from the same house, who developed throats one after the other. In all the cases I found only Hoffmann's bacillus. All got rapidly well. Now, if Hoffmann's bacillus is virulent enough to produce a sore throat, one would expect that in its passage through several throats (in one case three, and the other four) at least the last throats should show Klebs-Löffler bacillus if it is capable of being transformed.

My own opinion is that Hoffmann's bacillus causes a sore throat, and more, an infectious sore throat, but not diphtheria.

As regards the other organisms I have mentioned, the streptococci—i.e., longi—and staphylococci are generally pathognomonic of septic throats. They may be present alone, as they often are, or in conjunction with the Klebs-Löffler bacillus. There is one important point about their presence upon the throat, and that is that such patients are, I think, more susceptible to the invasion of diphtheria than those with healthy throats.

The conclusion which I should draw from my experience of this disease is that still more use should be made of the test-tube and

microscope for the purposes of diagnosis. Further, I consider that it would tend to check the spread of the disease, and what is also important, decrease the expenditure of the ratepayers, if the sanitary authorities would have every suspicious throat occurring in any of their public institutions, schools, etc., within their district examined bacteriologically. When one sees the way children in schools clean their slates, which are often common property, exchange sweets, borrow handkerchiefs, and so on, it is very easily explained why diphtheria spreads so well in schools. Further, if a case has occurred in any school or institution, I think it would be most desirable that every person in that school or institution should be examined, and cultivations taken from their throats, whether they show signs or no. If this were done, I am sure that many small epidemics could be aborted, for it not seldom happens that the first few cases of an epidemic are so mild that diphtheria is never suspected until it has got a considerable hold.

Enteric Fever.—The *B. typhi abdominalis*, *B. typhosus*, or bacillus of Eberth and Gaffky, may be considered without doubt the cause of enteric fever, and it can by suitable means be isolated from the body of a patient both during life and after death.

I think I am right in saying that of all the diseases with which we are familiar enteric fever is the one which least answers to the text-book descriptions. By this I mean that there are so many cases of this disease which are wrongly diagnosed in the earlier stages, and even throughout. There appears to be no single symptom which can be looked upon as pathognomonic, and it has often been mistaken for such widely different diseases as tuberculosis, influenza, malaria, septicemia, and pneumonia. As this is so, it becomes from the public health point of view urgently desirable that it should be diagnosed as early in the course as possible.

The bacillus is present in the faeces—being shed from the ulcers—in the spleen, mesenteric glands, gall-bladder, and it is said to have been found in the blood and the "spots"; it has also been found several times in the urine of convalescent patients.

The examination of the blood for the bacillus is all but hopeless, since it is doubtful whether it is constantly present, and even if so, it is in such small numbers. One thing is quite certain, and that is that in the earlier stages it is not a true septicemic disease. The difficulties attending the examination of the spots are very great even when the latter are present. The spleen, gall-bladder, and mesenteric glands are inaccessible in life, at least in this country. I do not think that many medical men would consider puncture of

the spleen as legitimate practice. As the bacilli are only found in the urine in quite the late stages, for purposes of diagnosis the examination of this fluid is futile.

The faeces, therefore, alone remain. The bacilli will not, even if they can, get into the faeces until the ulcers have begun to form. So long as there is only inflammation without necrosis, it is difficult to see how more than a very few could escape from the Peyer's patch or follicle. The ulceration only begins at the end of the first week, and probably does not reach the height of the process until the end of the second week. It would therefore be useless to search for the bacilli before well into the second week of the disease.

The amount of ulceration varies very considerably. In some recorded cases there has been no ulceration, and every degree is found from this to hundreds of ulcers in the lower portion of the small and upper portion of the large intestine. So far as I know, there is no means of diagnosing the amount of ulceration from the condition of the patient, so that in any individual case the number of typhoid bacilli in the faeces even at the end of the second week might be very small.

In addition to all this, there is another great difficulty to face. In faeces both from healthy and diseased people there are enormous numbers of the *B. coli communis*. In the present stage of our knowledge it is one of the most difficult (because so laborious) pieces of work to isolate the *B. typhi abdominalis* from a mixture which contains a very large excess of the *B. coli communis*. Probably someone will hit upon a method which is easy, but up to now no such method has—at any rate to my knowledge—been described.

The method which is usually adopted is to take a small portion of the faeces, as much as an ordinary platinum loop will hold, and with it make as fine an emulsion as possible with about 10 c.c. of sterile broth. One c.c. of this emulsion is then added by means of a pipette to 9 c.c. of sterile broth, and 1 c.c. of this to 9 c.c. of broth, and so on until 1 c.c. contains at most 1/1000 of the original faeces. The whole of this last test-tubeful of broth is then added to melted gelatin in quantities varying from 0.5 c.c. to 0.1 c.c. The gelatin is poured into Petri dishes and set, after which it is incubated at 20° C. for two or three days. The colonies which grow on the plates are then examined both with the naked eye and under the low power of the microscope. Any suspicious colonies are inoculated on to gelatin or agar, and examined both in culture and under the microscope.

Although I have succeeded in isolating the *B. typhosus* by this method, I must confess that I have failed to do so many times.

The obvious fallacy of the process is that the twenty or thirty plates only contain 1/100 of the loopful of faeces, and it is quite possible, if not probable, that this small amount contains no typhoid bacilli.

If one is fortunate enough to get a slough, there is more chance of isolating the bacillus, but even then it is not certain that one will be able to do so. The slough is washed well in order to remove as many as possible of the bacteria on its surface, and then a portion is broken down in sterile broth. This broth is then diluted and plated as before.

When by any chance a case has remained undiagnosed in life, it may become necessary to endeavour to prove it (post-mortem) to have been enteric fever. In such an event the best method is to try and isolate the *B. typhi abdominalis* from the spleen or enlarged mesenteric glands.

The post-mortem examination should be made as soon after death as possible. The spleen and one or two glands should be removed entire, washed well in warm or hot water, and placed in a clean flat dish. The upper surface should be well seared with a red-hot iron, and in the case of the spleen an incision about 1½ inches or 2 inches long made with a sterile knife. The spleen pulp may then be collected by means of a platinum loop, and the various cultivations and microscopic examinations made.

Provided that the examination is made not many hours after death, such a loopful will not contain very many organisms, so that great dilutions will not be necessary. One loopful may be inoculated into a melted gelatin tube, and after a thorough mixing, three loopfuls may be removed from this tube and placed into a second melted gelatin tube. They should then be poured into Petri dishes, and after being allowed to set, placed in the incubator at 20° C. Several "sets" of plates should be made.

In addition to this a loopful of the spleen pulp may be smeared over the surface of agar, glycerin agar, and added to broth and glucose formate broth. The last-named should be grown under anaërobic conditions at 37° C., and the other three under ordinary aerobic conditions at the same temperature.

The cultivations and plates should be examined, the purity of the growths ascertained, and then the cultural reactions worked out. The final test to be applied is the reaction of Gruber and Durham, which consist of adding the serum of a patient suffering from enteric fever, or, better still, that of an animal which has been immunized against the *B. typhi abdominalis*, to a broth culture of the suspected organism. If the serum causes the bacilli to mass together, and the serum is sufficiently dilute (1 per cent. of the mixture), we can

affirm that the organism we have isolated is really the bacillus of enteric fever.

Since Gruber and Durham introduced their reaction, we have been supplied with a test for enteric fever which is easy and fairly certain. Gruber, in first publishing an account of the reaction, suggested that it might be taken advantage of in the diagnosis of enteric fever and cholera. Subsequently Widal applied the reaction, and published a series of cases showing the value of the phenomenon. From that time not only has the reaction for the diagnosis of enteric fever been known as Widal's reaction, but several textbooks speak of doing Widal's reaction for the identification of the *B. typhi abdominalis*. More than this, the serum diagnosis for Malta fever is often known as Widal's reaction. It is now too late to endeavour to call Widal's reaction by any other name, but in fairness to other observers we should limit the term to what Widal really did, and that was to diagnose enteric fever by the application of Gruber's reaction.

In the first place it cannot be too well understood that this reaction is a quantitative and not merely a qualitative one. That is to say, the value of the reaction for diagnostic purposes depends upon the percentage of serum which is present in the mixture of serum and cultivation. Secondly, it is very inadvisable to try the reaction with a mixture of serum and red discs, because, as we shall see later, we want to get a reaction with a dilute serum, and the material in the hæmatocytes has a greater agglutinating power than the serum.

In 1897* I published the methods I adopted for the collection of the blood and the dilution of the serum, together with an analysis of sixty cases which I had examined. As many medical men have complained of the difficulty of obtaining the serum, I may be pardoned if I give a brief summary of the method which is employed at Guy's Hospital.

Collection.—In order to collect the serum, the most aseptic precautions possible must be taken. The lobe of the ear is well rubbed with 2 per cent. lysol until most of the keratinous epidermis has been removed, and the ear is hyperæmic. The lysol is then wiped off with sterile cotton-wool, and the ear subsequently mopped with methylated spirit and allowed to dry. When the ear is quite dry the lobe is pricked with a needle, such as I described in the *Journal of Tropical Medicine*.† Generally the blood begins to run at once, and is collected by holding one end of the special pipette to the issuing drop. The blood runs up the pipette without any suction.

* *Lancet*, May 29th, 1897.

† February, 1899.

Four good-sized drops are enough, and when this amount of blood has been allowed to run into the pipette, the clean end is placed to the mouth and slow, gentle suction applied. When the blood has by this means been transferred to the barrel of the pipette the latter is suspended by its ends in order to allow the blood to coagulate. After about fifteen to twenty minutes, when this has taken place, the ends of the pipette are sealed off, and the clean end is placed at the bottom of the test-tube in which it is kept. After a few hours the clear serum, free from corpuscles, collects at the lower end of the pipette, and is ready for dilution.

Although this method entails the use of a larger collecting pipette than is in general use, I think that it is easier in the end, because the serum is so free from corpuscles. When smaller bulbs are used, I have found it impossible to obtain the serum free from corpuscles unless it is centrifugalized. The needles I use, as I have explained before, are really lancet points, and are, in my opinion, the best instrument (the lancet excepted) with which to prick the skin. The prick is painless, and the needle leaves no mark. The most convenient method would doubtless be to absorb a few drops of the blood with blotting-paper and allow it to dry; but this method has two great disadvantages: first, there is no possible means of accurately diluting the blood; and secondly, serum free from the discs or their contents cannot be obtained.

The Dilution of the Serum.—When the mixture of serum and bacterial emulsion is made the serum should not form more than 5 per cent. of the mixture, for the purpose of positive diagnosis. There are several methods employed to dilute the serum. The most common method is to take one drop of the serum and dilute it on a slide or in a watch-glass with nineteen drops of broth, sterile water, or broth cultivation. This method has many disadvantages: firstly, the size of the drops will vary very considerably, so that the dilution is only approximate; secondly, there is a danger of the bacilli being spilled or handled; and thirdly, if the serum be diluted directly with the cultivation, the serum at the beginning of mixing will be in a considerable percentage, and may cause the bacilli to clump; when once they are clumped, they do not seem to get free again, and consequently pseudo-clumping is more likely to occur.

At Guy's three examinations are made of mixtures containing respectively 50 per cent., 5 per cent., and 0.5 per cent. of serum. These are made in the following manner: The 50 per cent. mixture is made by adding equal loopfuls of the serum and a broth cultivation of the *B. typhi abdominalis* on a cover-slip. The 5 per cent.

is made by diluting 10 cubic millimetres (measured by a graduated pipette) of the serum with 90 cubic millimetres of sterile broth, in a small test-tube. After thoroughly mixing, one loopful of this diluted serum (now containing 10 per cent. of serum) is mixed with the same loopful of the cultivation. The 0.5 per cent. is made by first diluting 10 cubic millimetres of the 10 per cent. serum with 90 cubic millimetres of sterile broth in a small test-tube, and then mixing equal loopfuls of this diluted serum and of the cultivation. The pipettes are quite easy to make and graduate, and when they are once made the method is extremely simple.

After the mixture is made on the cover-slip, this is inverted on to the ring of a hanging-drop slide, the upper surface of the ring having been well smeared with vaseline. This form of slide is used in preference to the ordinary hollowed-out slide because the cover-slips are so much easier to pick off, and the ring is not infected during the removal of the cover-slip, an infection which is inevitable in the hollow slides. The microscopic examination is the one usually employed, though occasionally a naked eye precipitation is also taken advantage of in the little test-tubes, or in sedimentation tubes similar to those described by Wright. There is one precaution to be observed in the macroscopic sedimentation, and that is that capillary tubes must not be used, since, as pointed out by Durham, these prevent the proper precipitation.

The Culture.—The culture is of considerable importance because of the pseudo-clumping which is said to take place. The procedure at Guy's is to replant an agar culture every fortnight, leave it in the warm incubator (at 37° C.) for twenty-four hours, and then transfer to the cool incubator. When an examination is to be made, a broth cultivation is made from the youngest agar culture we have, and allowed to grow for from eighteen to twenty-four hours. By doing this, in my experience, any pseudo-clumping is avoided.

The next point to consider is what is meant by a reaction. As regards the completeness of the clumping, this is somewhat difficult to describe, although easy to see. The general criterion is that the field of the microscope shall not be covered uniformly with the bacilli, but that the clumps shall be somewhat tightly drawn together, leaving the field between the clumps free from bacilli. The reaction time is half an hour, and about this we are very rigid; if there is a partial clumping only in the half-hour, we say that the serum does not give a reaction, but suggest that a second specimen of the serum should be sent up in two or three days' time. By doing this, we sometimes fail on the first occasions

to diagnose cases about which there is no doubt at the second examination. By rigidly adopting this reaction time, however, there is little danger of diagnosing a case as enteric which is not one.

As to the value of the reaction, I think that nowadays there is no doubt. Taking all three dilutions, we may get the following series of reactions:

50 Per cent.	5 Per cent.	0.5 Per cent.
1. +	+	+
2. +	+	0
3. +	0	0
4. 0	0	0

The first is undoubtedly that of enteric fever; the fourth may rightly be said to give no reaction. The second, according to my experience, is enough to be able to diagnose enteric fever; but the third is of no value for diagnostic purposes.

Starting with the consideration of the 0.5 per cent. dilution, if there is a reaction with this I think that there is absolutely no doubt that we are dealing with a case of enteric fever, and one would describe such a reaction as a strong one.

A positive reaction with the 5 per cent. serum, as I have said, is, in my experience, sufficient to enable us to diagnose enteric fever, because the serum is not in sufficient proportion to clump the bacilli if the patient is not suffering from this disease. It must be remembered, however, that this reaction is only sufficient for the examiner to say the patient is suffering or has suffered from enteric fever, because in the series of cases I published several of the cases gave a reaction after two, three, or six years. In order, therefore, to be enabled to say that the patient is suffering from this disease, we must be certain that the patient has not previously suffered from it at least during the past few years.

If the 5 per cent. serum gives no reaction, we are justified in drawing only the most meagre deduction. In the first place it will be necessary to know the day of the disease. I do not purpose discussing the question whether this is a reaction of infection or one of immunity, but merely to emphasize the fact that the day of the disease on which a reaction can be first obtained varies greatly. To quote from my own cases, I have got a very good reaction on the fourth day of the disease in one patient, and I have failed on several occasions to get a reaction on the eighth, ninth, and tenth days, when subsequent examinations have shown a very marked reaction. A few cases have also been published where the case was clinically enteric fever, but where no reaction could be obtained

as late as the seventeenth, eighteenth, nineteenth, or twentieth day of the disease.

If, however, a second negative result is obtained with the serum of a patient towards the end of the second week, I think we are entitled to say that it is unlikely that the case is one of enteric fever, but in such a case the effect of the 50 per cent. serum may be a great help to us. If a third examination with the 5 per cent. serum is made well in the third week, then it becomes very improbable that the case is one of enteric.

The result of the 50 per cent. serum upon the bacteria may or may not help us. If there be a reaction, we are not in any way assisted, because quite a large percentage of normal people have serum which will clump the *B. typhosus* in a strength of 50 per cent. If we get no reaction, it will be found to be of great assistance, and it is of very great value in confirming the absence of reaction with the 5 per cent. A normal patient whose serum gives no reaction gets enteric fever; it will be found, if the serum is examined from day to day, that a reaction will be obtained with 50 per cent. serum some days (sometimes several) before it can be obtained with the 5 per cent. serum. When we are dealing with a case which, say, on the tenth day of the disease gives no reaction in any of the three strengths, we can say with great confidence that the case is most probably not one of enteric fever. If, further, a second series of negative results is obtained, say, on the fifteenth or seventeenth day, then the chances of the patient having the disease are, in my opinion, very small. There is, unfortunately, the inevitable exception to this test. There are cases of enteric fever in which the body makes no attempt to combat the disease, and although the case is clinically typical, the serum fails to react. These will be found to be most severe and generally fatal cases. Fortunately, the very severity of the case would in most of these cases point to a correct diagnosis, and the danger of infection through a wrong diagnosis would be small.

I will cite two cases where the reaction has proved to be right and the clinical diagnosis wrong. One was the case of a boy aged fifteen, who had a persistent but somewhat erratic temperature. I examined the serum on the eighth, thirteenth, and nineteenth day after his admission to the hospital. I reported no reaction on the eighth day, the result being 50 per cent.—0; 5 per cent.—0; 0.5 per cent.—0. As, however, those in charge of him still thought there was a possibility of his having enteric fever, the second examination (thirteenth day) was made, and I reported that there was no reaction, and that I did not think the case could be one of enteric, because I got no

reaction with the 50 per cent. serum; and as I obtained the same result on the nineteenth day, I said I felt convinced that he was not suffering from this disease. Several days subsequent to this the boy developed symptoms which induced the physicians to diagnose tuberculous peritonitis.

The second case was that of a young child who had a temperature without any of the other usual signs of enteric fever. On, I think, the eighth day the serum gave a very strong reaction, the 0.5 per cent. being completely clumped within the half-hour. I said the case was one of enteric fever because of the reaction; but the clinical symptoms were accepted, and the case was used as an object-lesson of the small value of the reaction in certain cases. The child died, and among other facts confirming the diagnosis was that of the *B. typhi abdominalis* being isolated from the spleen.

Although there is much to be said concerning the diagnosis of the other diseases I have mentioned, they can hardly be said to be as yet within the routine work of a sanitary bacteriologist. I shall therefore omit any mention of them, and proceed at once to the second portion of my paper, viz.:

2. PREVENTIVE EXAMINATIONS.

By this term I mean the examination of air, soil, water, milk, etc., for evidence of the organisms which are transmitted to man from these sources. I do not purpose dealing with all these, but shall content myself with milk, including ice-creams, and water.

(a) *The Examination of Water.*—Two different kinds of examinations of water are made in order to determine its suitability or safety for drinking purposes: (1) The quantitative; and (2) the qualitative, for certain specified organisms.

1. *Quantitative Examination.*—This examination is made in order to get an idea of the approximate number of living bacteria present in the sample. The usual method is to inoculate tubes of melted gelatin with known quantities of the water, pour them into Petri dishes, allow them to set, and incubate at 20° C. for two, three, or four days. The colonies which then appear are counted.

This will only reveal the presence of some of the micro-organisms present, since there may be many kinds present which will not grow under these conditions. In any sample of water there may be—

1. Moulds.
2. Yeasts or torulae.
3. Bacteria which will grow at 20° C.
4. Bacteria which will not grow below 30° C.
5. Thermophilic bacteria.
6. Nitrifying bacteria.
7. Anaerobic bacteria.

In practice, however, it is found that the number of organisms which develop on the gelatin-plates is a very fair criterion of the total number—at any rate, for the sake of comparison. I shall later give some experiments to show that this is really so.

As the quantitative examination is chiefly for purposes of comparison, great care must be taken to have all the conditions as nearly alike as possible. This necessitates attention being paid to (a) the collection; (b) the media; (c) the inoculation and plating; (d) the temperature of incubation; (e) the period of incubation; and (f) the enumeration.

The Collection of the Sample.—The vessel in which the sample is collected need not be large, since not more than 2 or 3 c.c. of the water are used. A very convenient bottle is a narrow-mouthed glass-stoppered bottle of 1 ounce capacity, the stopper overhanging the lip of the bottle so as to prevent dust falling on to the lip. This is sterilized in a hot-air sterilizer at 150° C. for three-quarters of an hour, with the stopper removed and lying beside it. After the bottle has been sterilized, and the sterilizer allowed to cool, the door is opened, and the stopper immediately replaced.

If the sample is to be collected direct from a tap, the tap is turned on, the stopper removed from the bottle and held in the hand, whilst the water is allowed to run into the bottle until it reaches the shoulder. The stopper is replaced, and tied down. The stopper should never be sealed, because it is almost impossible at times to remove all the sealing-wax without danger of contamination.

In collecting water from a pipe, it must be remembered that the pipes in houses are often warm, especially those in the kitchens. The number of organisms present, therefore, in the water in the warm pipe is often greatly in excess of that in the water in the main. In order to be fair, a sufficient quantity of water should be drawn off before the sample is taken to insure that the sample is really from the main.

If there be no tap, but the water is to be collected from a reservoir, stream, or tank, one end of a piece of stout wire should be bent round the neck of the bottle, the stopper should be removed, and, holding the wire about a foot from the neck, the bottle should be quickly dipped into the water, and held 3 or 4 inches below the surface. When it is full, it should be quickly drawn up, a few cubic centimetres poured out, and the stopper replaced. The stopper should be carefully held in the hand, and not be allowed to touch anything.

When the water is collected, it is usually some distance from the

laboratory. The difficulties which attend the manipulation of the water, plates, etc., on the spot are so great that it is, I think, always advisable to convey the samples to the laboratory, where everything is to hand, and where the inoculations can be done under proper aseptic conditions. Since, however, the organisms may multiply in transit, especially in hot weather, it is necessary to take precautions against this, in order that we may be sure that the number of organisms we find on the plates may be the number present in the water at the time of the collection. The best method to adopt is to surround them with ice.

I have a portable ice-box (which is a modification of one which I made some years ago with the help of Dr. Eyre), which I have used for the past three years, and have found to work so well that I will venture to describe it.

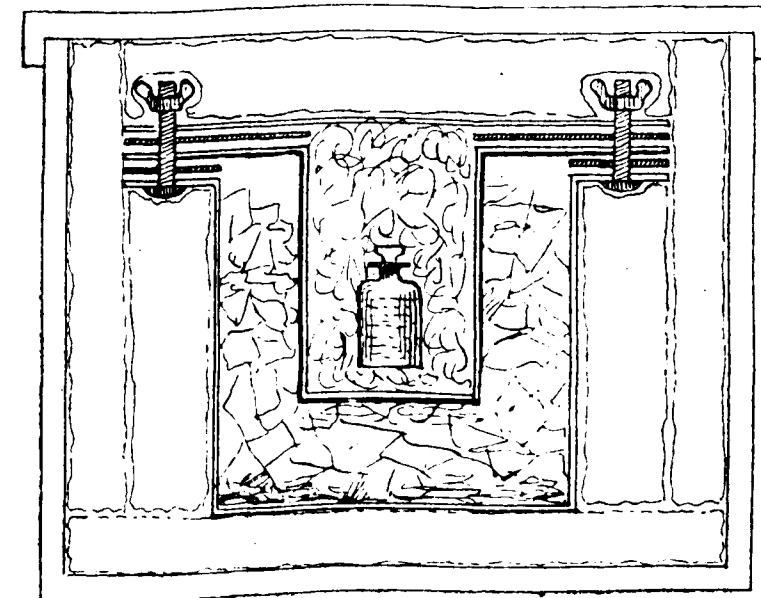


FIG. 1.—ICE-BOX FOR SAMPLES.

The accompanying diagram (Fig. 1) is a section of the whole apparatus, which consists of a circular copper box enclosed in a square felt-lined wooden box. The copper box is in three pieces: a wide cylinder with a narrow flange; on to the bottom of this is fixed a narrower cylinder, into which fits a third cylinder with a wide flange, the space between the two flanges being occupied with a sheet of indiarubber. The lid fits on top of the narrow cylinder, a second sheet of indiarubber being interposed. Six holes are drilled through each of these parts as seen in the diagram, and six

screw bolts of gun-metal are soldered on to the underneath flange. Gun-metal nuts serve to clamp the lid and two flanges together. There are thus two boxes, one inside the other.

In order to charge this box for the transmission of the sample of water, the lid is removed, and the inner box is taken out. The outer box is filled with finely-chopped ice, and the inner box is replaced; in the latter are placed the sterile bottles, packed in cotton-wool, and finally the lid is put on, and the whole firmly clamped down. The whole is then placed in the wooden box, the top layer of felt put on, and the wooden box closed with a strong, well-fitting lid, on which a strong handle is placed.*

When the water is to be collected, the wooden box is opened, the layer of felt removed, the lid unscrewed and removed, the bottles taken out, filled, and replaced, and the whole fastened up again.

It will be seen that, however the box is placed, whether on its side or upside down, it is impossible for the ice or water to get out of the outer box, and, what is more important, it is impossible for anything to get into the inner box. When the bottles are taken out they are quite dry, and as there is no chance of their having been contaminated, as when they are immersed in ice and salt, there is no need to wash the outsides "with good tap-water, and dry with a sterile towel." Very rarely it happens that, through injudicious packing, one of the bottles gets broken during the transit, but when they are properly packed there is very little danger.

I tried several experiments with the box before using it, and I could never satisfy myself that there was any increase in the number of organisms in the water kept in the bottles, provided that the ice was not melted. Although the apparatus is comparatively small, the ice does not melt quickly. The most severe test I tried was to leave the box in my laboratory in the height of summer (when the temperature ran up to 30° C. in the afternoon) for thirty-six hours. When I opened it the ice had not all melted. I must confess that I took special precautions to fill the box with finely-chopped dry ice; but even if it is not filled with such care, one rarely finds that the ice melts in less than twenty-four hours.

The Media.—Nutrient gelatin, commonly called "gelatin," is the medium most commonly used for the quantitative examination. Very great care should be taken in making the medium, and each batch should be made as nearly alike as possible, both in consistency, alkalinity, and amount of heating. The same make of peptone and gelatin should always be used. As I think sufficient attention has not been paid to this point, I will venture to describe how the medium

* This box may be procured from Messrs. Baird and Tatlock.

is made at Guy's. If it needs any apology, I will urge that two authors have within the last year given directions for the examination of bacteria in water, and have not mentioned this point. One has, in describing the manufacture of gelatin, omitted to give directions for neutralizing it.

One pound of finely-chopped beef, as free from fat and connective tissue as possible, is incorporated in a litre of water. The whole is then raised slowly to 60° C., preferably in a water-bath, kept at this temperature for about ten minutes, and then quickly heated to boiling-point. This is now filtered into a clean flask, and made up with water to 1 litre again. Distilled water should be used rather than ordinary tap-water, because the character of the water affects the growing power of the gelatin. This meat infusion now contains the salts and extractives of the beef, and a little acid albumin.

Ten grammes of peptone (I have found Witte's to be the most satisfactory) and 5 grammes of common salt are carefully weighed and placed in a clean dish. The mixture is rubbed up very carefully with small quantities of the meat infusion in order to dissolve the peptone. If this is not done, dry masses of peptone may be found even after boiling. If by this time the infusion is cold, it should be warmed in a water-bath, and 100 grammes of gelatin ("Best French") added. The flask is now placed in the steam sterilizer in order that the gelatin may be thoroughly dissolved; it should be taken out every few minutes, and well shaken, in order to prevent the gelatin settling as a sticky layer at the bottom. When the gelatin is quite dissolved, the flask is removed, and at once neutralized with $\frac{N}{1}$ NaOH, using litmus as the indicator. When it has been neutralized, 4 c.c. of the NaOH are added, the contents of the flask are cooled to 50° or 55° C., and the white of an egg is added and well incorporated by vigorous shaking. The flask is now placed in the steam sterilizer for half an hour, by which time the egg has coagulated in large flakes, leaving the internatant fluid clear. It is then filtered through "papier Chardin" into a clean flask, and run through a filling apparatus (delivering 10 c.c.) into the sterile test-tubes. The gelatin tubes are at once placed in the steam sterilizer for twenty minutes, and treated in a similar manner on the two succeeding days.

Whether my experience agrees with that of other observers I do not know, but the above method has not been adopted without a considerable amount of labour and experiment. In the first place, lean beef is used, although it is some bother to prepare, as organisms grow much better on gelatin made from meat than on

night or 2s. a week for a bed, and the use in common with other occupants of the rooms hereinafter mentioned. The officials in charge of the shelter had such discretionary power as arose under such "Orders and Regulations" to admit persons for a less payment, or with no payment, if they thought fit so to do, and such persons when so admitted would in like manner have each a bed and the use of the said rooms. The name of the respondent was not entered as the keeper of the house in the register of common lodging-houses kept under the Common Lodging-houses Act, 1851.

2. On May 16, 1899, there were in the house 157 beds (or bunks). On the ground-floor there was an open dormitory (not divided into cubicles) containing nine bunks for eighteen occupants. On the five upper floors were open dormitories (not divided into cubicles) containing in all 137 beds and one bunk for two occupants. The bunks were placed one above the other in the same manner as berths are placed in the cabin of a ship, and were used only in those rooms where there was not sufficient floor-space to provide beds for the same number of occupants as could be accommodated in the bunks.

3. On the ground-floor of the house there were a sitting or meeting room and a kitchen, both of which were used in common by all the occupants. Any occupant when admitted was entitled to cook his food at the fire provided in the kitchen, but had to provide his own food, and was not provided by the respondent with any food in consideration of either of the above payments.

4. Only men were admitted as occupants of this shelter. Men who were drunk and disorderly were not admitted, or, if they had been admitted, were turned out.

5. The occupants of "The Harbour" were of the same class of men as those who generally sleep in registered common lodging-houses, save that some of the occupants received there were so dirty that they would not usually be received in a registered common lodging-house.

6. Evidence was tendered on behalf of the appellant which it was asserted would show (1) that if all the beds were occupied the house would be overcrowded, and (2) that the house and the beds, bedding, and utensils therein were in an uncleanly and insanitary condition. The whole of this evidence was objected to by the respondent, and it was rejected by the magistrate, on the ground that it was irrelevant to the question in issue before him—namely, whether the shelter was a common lodging-house within the provisions of the Acts.

7. The house was kept as a Salvation Army shelter by the respondent for charitable or religious objects, the keeping of the house being part of the social work promoted by a body of persons known as the "Salvation Army" in connection with the "Darkest England Scheme," and acting under the orders of respondent, and the receipts of the shelter were carried to the funds of the "Darkest England Scheme Trust" through the medium of the officials of the Salvation Army.

8. In the accounts kept by the Salvation Army of the working of all the shelters used in connection with the "scheme" for the year ending September 30th, 1898, being the last year the accounts of which were available, the receipts in respect of "The Harbour" were put down at £972 10s. 11d., and the outgoings for purchases, wages, and expenses, certain estimated expenses of management were included, quarters of the Salvation Army at Whitechapel in connection with a

the shelters used for the purposes of the "Scheme" (including "The Harbour"), and not at "The Harbour." The same accounts showed an increase of £124 17s. 6d. in respect of the value of stock on hand on September 30th, 1898, as compared with September 30th, 1897, at divers shelters (including "The Harbour") under the control of the respondent, used in connection with the "Scheme," but it did not appear whether all or any of such increase in value was represented by stock in "The Harbour." It also appeared from the accounts that for that year on the working of all the shelters throughout England there was a loss of over £600.

9. It was proved that in common lodging-houses in the county of London which are kept for the purpose of making a commercial profit, and not for charitable objects, there are about 13,000 beds let at the same price as that charged by the respondent for beds in "The Harbour."

10. The appellant tendered the evidence of certain keepers of registered common lodging-houses who, it was alleged, could show that they had made, and still make, a profit by keeping such lodging-houses while charging the same prices for beds as those charged by the respondent; but the evidence was objected to on behalf of the respondent, and was rejected by the magistrate as irrelevant.

The "Orders and Regulations" contained a statement that the charges made were within the reach of the poorest, and that the shelters afforded the accommodation, not as a work of charity only, but on a business basis, so that the inmates were not demoralized by charity, knowing that they paid for what they had, and had only what they paid for, and that in the shelters the very outcasts of society were brought, for a season at least, into conditions of health and cleanliness. They contained provisions for holding certain religious exercises and meetings, at which attendance was not compulsory. Further, a provision that the shelters were not to be allowed to become the permanent homes of men who were able to pay for more accommodation than the shelter provided. That the shelter must not be allowed to assist idle men in their efforts to lead a lazy life, nor to become in any way a channel or means for the dissemination of disease. There were also certain provisions in the "Orders and Regulations" as to bringing influence to bear on the inmates, and as to endeavouring to find employment for them, and a number of provisions directed to the preservation and promotion of health, such as provisions with regard to air-space, avoiding wood for fitting up shelters, and caulking wood floors.

The magistrate held that the facts proved in the present case were not distinguishable from those in *Booth v. Ferrett* [1890],* and that "The Harbour" was not a common lodging-house within the Common Lodging-houses Acts, 1851 and 1853.

The questions for the opinion of the Court were:

- (1) Whether this case is distinguishable from *Booth v. Ferrett*, and
- (2) If not, whether the latter case was rightly decided?
- (3) Whether on the facts above stated "The Harbour" was a common lodging-house within the Common Lodging-houses Acts, 1851 and 1853?
- (4) Whether all or any of the evidence tendered on behalf of the appellant was wrongly rejected?

Jelf, Q.C. (Byde with him), for the appellant.—There is nothing to show that the provisions of the Acts of 1851 and 1853 as to the registra-

the shelters the very outcasts of society are brought, for a season at least, into conditions of health and cleanliness. Next, there are certain religious exercises and meetings to be held, at which attendance is not compulsory. It is also provided that the shelters are not to become the permanent homes of men who are able to pay for better accommodation than the shelter provides. Again, the shelter must not be allowed to assist idle men in their efforts to live a lazy life. Next, the shelter must not be permitted to become in any way a channel or means for the dissemination of disease. Then there are certain provisions as to bringing influence to bear on the inmates, and as to endeavouring to find employment for them, and a number of provisions, very carefully, if rigorously carried out, directed to the preservation and promotion of health. "The Harbour" so described and so conducted in no material particular differs from the house the subject of inquiry in *Booth v. Ferrett*. We therefore think that the present case is not in principle different from that case. The next inquiry is, Was that case rightly decided? The learned Judges in *Booth v. Ferrett* came to the conclusion (but with hesitation) that a similar house and similarly conducted to the present was not a common lodging-house on two grounds: First, that it was not carried on as a business for the sake of profit, but as a humane or charitable enterprise; and secondly, that it was not open to all comers, as it was stated a common lodging-house was. Before examining these grounds of decision more closely, it will be well to examine the scheme of legislation on this subject, and to endeavour to get a clear conception of its object. It is not necessary to go further back than the Act of 1851. That Act is called the Common Lodging-houses Act, 1851, but it gives no definition of what a common lodging-house is. Section 6 authorizes the local authority by notice to require the keeper of any common lodging-houses to register such house, and section 9 empowers such authority to make regulations respecting common lodging-houses; and by section 10 the same authority may impose penalties upon offenders against the regulations. Sections 11, 12, and 13 contain provisions as to notice of infectious diseases, for inspection at all times when required by any officer of the local authority, and as to the cleansing of such common lodging-houses and the drains, etc.; thereof. Section 14 enacts the penalties for offences against the Act. The Act of 1853 makes further provision with respect to common lodging-houses. It is to be read with the Act of 1851. Section 3 provides that no person shall keep a common lodging-house until the house has been inspected and approved on behalf of the local authority and registered under the Act of 1851. By section 4 it is provided that the local authority may refuse to register any person as keeper of a common lodging-house who does not produce a certificate of character signed as there mentioned. There are other provisions, which it is not necessary to detail, as to reports from the keepers where beggars and vagrants are received, as to powers to remove causes of complaint under the Nuisances Removal and Diseases Prevention Act, 1848 (11 and 12 Vic., cap. 123), in relation to such common lodging-houses; and by section 11 the provisions of section 14 of the Act of 1851 as to penalties are made applicable to offences under the Act of 1853. The Acts of 1851 and 1853 are clearly sanitary Acts. They deal with houses to which the very poorest and most wretched class of the population resort, and with conditions in which numbers of that class herd together, availing themselves of the sordid accommodation offered, for which a very low price is charged. In such persons, uncleanness to a large extent, un-

healthiness, and even actual disease — infectious or non-infectious — will probably be found to exist. If, therefore, care is not taken to insure cleanliness and other healthy conditions as to air supply, water supply, and so forth, these houses may become a source of danger not only to their inmates, but to the general public. The legislation, therefore, on this subject had for its object, by inspection and control, to secure for the poor in these houses conditions safeguarding health and preventing the spread of disease, which people better off are supposed to be able to secure for themselves (see *per* Lord Justice Lindley in *Langdon v. Broadbent*). The statutes in question are therefore to be regarded simply as measures of sanitary protection. Applying these considerations to the first ground on which the decision in *Booth v. Ferrett* was based, it seems impossible to admit that the fact that the house or building in question was carried on for charitable objects, and not for gain, would take it out of the measure of sanitary protection, if otherwise it would be within it. The question is not with what object or prompted by what motive the house is carried on, but whether the house is such and is so carried on as a lodging-house as to be within the provisions of the Act, as it is clearly within the mischief aimed at by the Act. It is to be observed that the learned Judges in *Booth v. Ferrett* differentiated the house in that case from a common lodging-house only on the two grounds which I have mentioned. If large numbers of the most wretched class are sleeping in common rooms, insanitary conditions are, in the absence of inspection, supervision, and control, not unlikely to arise; and it was the object of the law to secure that inspection, supervision, and control. We fail to see the relevance, in this connection, of the motive actuating the keeper of such a house, whether it be philanthropic or mercenary. But the second ground of the decision is that "The Harbour" is not within the statute, on the ground that a common lodging-house is open to all comers in this sense — that the keeper of such a house cannot refuse admission to any applicant. Is this so? To give to a common lodging-house this character is to attach to its keeper obligations analogous to those of a common carrier or a common innkeeper. We are unaware of any authority for this position. The language of Mr. Justice Lindley in *Langdon v. Broadbent* is referred to, where he speaks of a common lodging-house as one "open to all comers"; that is, as we understand the language, where practically all comers are received without discrimination. But that is a very different thing from saying that the keeper is under an obligation to receive all comers. We see no reason to doubt that the keeper of a common lodging-house might refuse to admit drunk, or disorderly, or uncleanly men, or men of known evil reputation, as thieves and the like, or indeed any person whom he chose to exclude. Further, it seems to us, on the facts before us, that "The Harbour" might properly be described in the same sense as open to all comers. In fact, practically all comers are admitted. The very outcasts of society are objects of the humane solicitude of the respondent. Even verminous subjects who are willing to submit to cleansing operations are admitted, and, in paragraph 5 of the Case before us it is stated that the occupants of "The Harbour" are of the same class as those who frequent registered common lodging-houses, but that into "The Harbour" are received persons who would usually be refused admission, because of their filthy condition, into registered common lodging-houses. The only restrictions on admission which may suggest a difference between "The Harbour" and registered common lodging-houses are the regu-

lations—first, that men who are able to pay for better accommodation are not allowed to make "The Harbour" their permanent home; and secondly, that "The Harbour" is not to be used to assist idle men to lead a lazy life. We cannot assent to the view that this is sufficient to differentiate the two classes of houses. We know of no better description of a common lodging-house than that given by the then law officers, Sir Alexander Cockburn and Sir W. Page Wood, to the effect that a common lodging-house is that class of lodging-house in which persons of the poorer class are received for short periods, and, though strangers to one another, are allowed to inhabit one common room (Lumley, PUBLIC HEALTH, 5th ed., p. 99). If this be the proper description of a common lodging-house, as we think it is, we cannot see in what material respect it differs from the respondent's shelter. We arrive, therefore, without hesitation, at the conclusion that such shelter is a common lodging-house within the meaning of the Act of 1853. It follows that we think that *Booth v. Ferrett* was wrongly decided, and that the magistrate's decision was wrong in point of law. It is to be observed, however, that the magistrate decided in deference to the authority of *Booth v. Ferrett*, and indeed that the same magistrate had in that very case decided that in his judgment the shelter was a common lodging-house. We desire to point out that in delivering his judgment Lord Coleridge was careful to say that he delivered it without any great degree of confidence. Differing from the decision of the Court in that case, ought we nevertheless to act upon it? We think not. The case, being criminal in its nature, could not have been brought under review by appeal. It was decided only nine years ago, and should preclude us from expressing the view of the law which we are convinced is right. It was, indeed, argued upon behalf of the respondent that since that case was decided there has been legislation on the subject, and that the Legislature has not seen fit to alter, but in effect has recognised, the law to be as declared in *Booth v. Ferrett*. Is this so? If, indeed, it could be shown that the Legislature had subsequently legislated in a way which demonstrated that it was accepting and adopting the law as so laid down, and that it proceeded to further legislate on the express or clearly implied acceptance of that declaration of the law, we ought not to disturb the decision in question. But is it so? We think not. The legislation referred to is the Public Health (London) Act, 1891 (54 and 55 Vic., cap. 76). In the first place, it is to be observed that is an Act which applies only to London, whereas the Act of 1853, upon which the present question arises, is a general Act. But, further, the provisions in the Act of 1891 are not provisions directed to the subject of common lodging-houses. It is a general Act, consolidating and amending the laws relating to public health in London. It deals with nuisances, offensive trades, smoke consumption, removal of refuse, water-closet regulations, unsound food, provisions as to water, notification and prevention of infectious diseases, and the like. No doubt some of its provisions are applicable to lodging-houses in common with all other houses, but it is noticeable that section 94, which alone refers to houses let in lodgings, and which enables the sanitary authority to make bye-laws as to them, expressly excepts common lodging-houses from this class. We conclude, then, that there has been no legislation which adopts or proceeds upon a recognition of the law as declared in *Booth v. Ferrett*. Our answers, therefore, to the

questions put to us in the case are as follows: As to the first question, we say that this case is not distinguishable in principle from the case of *Booth v. Ferrett*. As to the second question, we say that the case of *Booth v. Ferrett* was wrongly decided. As to the third question, we say that the respondent's lodging-house was a common lodging-house within the Acts of 1851 and 1853. These answers render it unnecessary to consider the question of the admissibility of the evidence tendered by the appellant and rejected by the magistrate. The result is that the appeal will be allowed, and that the case will be remitted to the learned magistrate, with an intimation of our judgment upon it. Under the circumstances there will be no costs of the appeal, and, having regard to the decision of *Booth v. Ferrett*, on which the respondent was justified in acting, the learned magistrate will, no doubt, think that the smallest nominal fine will meet the justice of the case. We desire to say that we should regret if the result of our decision were seriously to interfere with the humane work of the respondent. We do not think it will or can, but, whether it does or not, the law must be observed. We have read the careful regulations framed for the good government of "The Harbour" and the respondent's other similar houses, and noticed the anxiety manifested in those rules not only to insure observance of all conditions necessary to secure cleanliness and good health, and to prevent the growth and the spread of disease, but also to observe the law, whatever that law may be. Indeed, part 2, chapter 2, rule 24 of the respondent's regulations expressly provides that every shelter shall be fitted up in accordance with the requirements of the sanitary authorities of the district. On the other hand, we trust that those who are charged with the enforcement of the law will do all they can, consistently with their duty and with effecting the objects of the law, to avoid anything like harshness or unreasonableness in its enforcement.

Appeal allowed.

MAGISTRATE'S CASE.

February 1st and 2nd.

BEFORE CHANNELL AND BUCKNILL, JJ.

LOGSDON v. TROTTER.

Local Government — Common Lodging-house — Non-Registration—House Furnished with Separate Cubicles containing Single Beds for Men—Common Lodging-houses Act, 1851 (14 and 15 Vic., cap. 28), section 7.

Case stated by a Metropolitan police magistrate, who had dismissed the information of the appellant on behalf of the London County Council against respondent, charging him with keeping a common lodging-house, and receiving lodgers therein, which had not been inspected and approved by the local authority and registered under the Common Lodging-houses Act, 1851.

The house, known as the "Victoria Home," was situate in the Whitechapel Road, and was one of three houses the property of a body of trustees, of whom the respondent was one. The trustees established and carried on the "home" under the terms of a deed whereby they agreed to hold certain property for the purpose of establishing and carrying on an institution called "The Emigrants' and Working Men's

Home Association." This home had accommodation for 128 men lodgers—that is to say, it contained 128 single-bedded cubicles or bedrooms and certain rooms used in common. Each cubicle was 6 feet 6 inches long, 4 feet 6 inches wide, and the partitions were 6 feet 6 inches high. Each lodger paid 6d. or 8d. a night, according to the position of the cubicle he occupied, and for that sum was entitled to the use of the common rooms and of the kitchen in an adjoining building. The practice, however, of lodgers cooking their own food was not encouraged by the trustees. Regard was had to the moral and spiritual welfare of the lodgers, and efforts made to find them situations and assist them in illness. A certain number of the lodgers were of a better class than the "dosser class," but the majority were of that class. Men only were admitted. Men drunk or disorderly, or suspected of being criminals or of being verminous, were not admitted; but with this saving, all comers, being men, were admitted on payment.

The home was carried on at a profit, which was appropriated to the charitable objects of the trust. A considerable portion of the sum for its erection and for the purchase of the site had been subscribed by friends of the institution as a gift.

The learned magistrate, whose decision was given before the decision in *Logsdon v. Booth*,* dismissed the information upon the ground that the house was not carried on for profit, but solely for assisting the poorer classes of the population, and that the facts could not be distinguished from those in *Booth v. Ferrett*.

A. R. Jelf, Q.C., and W. C. Ryde for the appellant.
F. F. Dally for the respondent.

February 2nd.

Cur. adv. vult.

The COURT (CHANNELL and BUCKNILL, JJ.) held that the house in question came within the scope of the decision in *Logsdon v. Booth*, and was therefore a common lodging-house like the Salvation Army Shelter.

Appeal allowed.

CORRESPONDENCE.

DEFINITION OF "HOUSE."

TO THE EDITOR OF "PUBLIC HEALTH."

SIR, The appended case of *Kimber v. Admans*, heard in the Court of Appeal, before the Master of the Rolls and two Lords Justices, on February 16th, and reported in the *Times* of 17th, is so important that I beg you will insert it in your current issue for the purpose of at once placing on record the rapidly varying legal decisions as to what constitutes a "house." This decision in the case of *Kimber v. Admans* appears to be diametrically opposite to that in the case of *Rogers v. Hosegood*, quoted in my paper on "Separate Dwellings," published in the February number of *PUBLIC HEALTH* (p. 312).

I am, Sir,

Yours, etc.,

JOHN F. J. SYKES.

February 20th, 1900.

* *Vide supra*.

"KIMBER v. ADMANS.

"This was an appeal from a decision of Mr. Justice Cozens-Hardy's. The plaintiff and the defendant were owners of adjoining plots of land forming part of a building estate. Each plot was subject to a covenant not to build more than one house upon it. The defendant proposed to build a block of flats upon each plot of land belonging to him. The plaintiff complained of this as a breach of the covenant, and moved for an injunction to restrain the defendant from erecting these buildings. Mr. Justice Cozens-Hardy refused the motion, being of opinion, upon the construction of this covenant, that each block of flats was one house only, and not a series of houses. The plaintiff appealed.

"Mr. W. H. Cozens-Hardy was for the plaintiff; and Mr. Buckmaster for the defendant.

"The COURT dismissed the appeal.

"The MASTER OF THE ROLLS thought that the learned Judge was clearly right. What was the meaning of the word 'house' in this covenant? In his Lordship's opinion it did not refer to the mode in which the building was to be subdivided and let, but to the aggregate of the rooms making up the building. No doubt a portion of a house might be a house for some purposes, as for purposes of rating or franchise, but when the word was applied to a covenant of this description it did not refer to the interior portions of the building, but to the whole thing. This covenant was directed not to the parts, but to the aggregate.

"LORD JUSTICE RIGBY agreed.

"LORD JUSTICE VAUGHAN WILLIAMS also agreed. In construing this restrictive covenant he thought that the question to be asked was, What was the object of it? and if he could see no object in the covenant if it was simply limited to the brick-and-mortar erection, he would be disposed to put upon the word 'house' a meaning which would cover the user of the house as distinguished from the physical erection. But he did not think that anyone familiar with building estates in London would have any difficulty in ascertaining the object of this covenant, if the word 'house' were construed as meaning the physical erection."

ELECTION OF PRESIDENT OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

TO THE EDITOR OF "PUBLIC HEALTH."

SIR,

The month for the nomination of President having again come round, I venture to suggest that it is time that the present haphazard style of nomination should be in some manner regulated.

To speak of the turn of this Branch or that Branch of the Society is manifestly absurd, for the right of nomination is without doubt vested in the body of Fellows, any two of whom can nominate.

It is the desire of every well-wisher of the Society to secure that the most worthy Fellows should in their turn occupy the position of President, and it seems to me that it would be a distinct gain if some bye-law not inconsistent with the Articles of Association could be devised by means of which, irrespective of Branch, clique, or party, a truly representative nomination could always be assured.

I am sure, Sir, that this wish coincides with the views of many of our Fellows, and I trust that the Council will see their way to put such a plan in force without delay.

I beg to be allowed to sign myself,

Yours sincerely,

A PROVINCIAL OFFICER.

February, 1900.

SANITARY MALADMINISTRATION.

TO THE EDITOR OF "PUBLIC HEALTH."

SIR,

The new Municipal Boroughs in the Metropolis have been created none too soon, and I for one hope they will so acquit themselves that Parliament may soon be induced to transfer to them many of the powers now possessed by the County Council, but which they do not exercise, but leave to the sweet will of the private committee-room or the more private chair of the official.

In 1855 Parliament passed the Metropolis Local Management Act, which gave our London Central Authority the power to make drainage bye-laws, but for nearly half a century we have been without such bye-laws. Last year the County Council adopted a set of drainage bye-laws, and submitted them to the Local Government Board for the necessary approval. In August last I ventured to point out to the Local Government Board what appeared to me and to many others the very faulty construction of the proposed bye-laws.

To take only one point. For some years now the bye-laws under the Public Health (London) Act, 1891, have provided that *EVERY soil pipe in connection with a new building shall be outside the building*. With this very definite bye-law the St. James's Vestry permitted nine soil pipes to be placed inside a new building in Pall Mall, viz., the Carlton Hotel, and the County Council "took no action in the matter," their favourite formula with regard to Sunday concerts and other matters, where their policy is to harass instead of intelligently regulate.

This definite bye-law is to be repealed and another substituted under the Act of 1855, and this new bye-law runs thus: "A soil pipe in connection with a new building or an existing building shall, whenever practicable, be situated outside such building." Now, a site like that on which the Carlton Hotel has been erected is not a small one, and soil pipes do not occupy a large area, so that given the desire, it would be practicable to find room for the soil pipes outside without unduly reducing the size of the building.

In my letter to the Local Government Board in August last I said:

"In the interest of the sanitary administration of the Metropolis, it is very desirable that these bye-laws should be definite, and a careful reading of them shows that they might be made much more definite than as proposed, and that they would gain in clearness by being made more concise.

"Such terms as 'whenever practicable,' 'as near as practicable,' 'where any other mode of construction may be impracticable,' 'except where unavoidable,' 'equally suitable,' which appear repeatedly in the proposed bye-laws, should be avoided where possible, and if used at all, surely the authority to decide the matter should be stated, or endless disputes must arise as to what is practicable, unavoidable, or equally suitable."

On Tuesday last I received the reply of the Local Government Board as follows:

"I am directed by the Local Government Board to advert to your letter of August 17th last relative to the bye-laws proposed by the London County Council with respect to the drainage of buildings under the Metropolis Management Act, 1855, and to enclose for your information extracts from a letter which the Board have received from the London County Council with whom they have been in communication upon the subject.

"The Board direct me to state that they have considered the representations which you submitted, but that they see no sufficient reason for pressing the Council to make further alterations in the bye-laws, and they have expressed their willingness to approve the series in its present form."

The extract from the County Council enclosed began thus: "The Board call for the Council's observations on a letter from Mr. Mark H. Judge criticising the bye-laws." I had followed the proceedings of the County Council, and, not having seen any minute on the matter, I wrote to the Clerk of the County Council to say that I desired to see the minute on which his letter to the Local Government Board was based, and to this I received the following reply, dated February 14th:

"In reply to your letter of the 13th instant on the subject of the new drainage bye-laws, I have to inform you that there is no minute of the Council to which I can refer you with regard to your observations on the bye-laws."

I particularly wish to make it clear that the Local Government Board applied to the County Council for the "Council's observations" on certain criticisms which had been made on the proposed bye-laws, and an answer is given without the said criticisms having ever been submitted to the Council.

The observations which were sent to the Local Government Board included the following:

"Mr. Judge expresses his objection to the use of such terms as 'whenever practicable,' 'except when unavoidable,' and 'equally suitable,' which appear repeatedly in the bye-laws. As the Board are no doubt aware, in drafting the bye-laws, it was found practically impossible to lay down definite rules of construction which would apply in every case, and the terms in question give elasticity to the bye-laws, without which their enforcement would be found extremely difficult, if not impracticable. Mr. Judge suggests that if such terms are used, the authority to decide in case of dispute should be stated; but this is a matter determined by statute, and not one which can be dealt with by bye-law."

Many beside the Local Government Board are aware that it is "practically impossible to lay down definite rules of construction" in many of the matters attempted to be dealt with in these bye-laws, and will, I am satisfied, agree with me that until it is practically possible to do so there is no justification for making bye-laws at all. To adopt bye-laws with an elasticity which is determined by the will of a public sanitary inspector would be to create a public danger, and, if permitted, will make the sanitary administration of the Metropolis, which is already oppressive, a tyranny, which in the interest of the community will have to be resisted.

I am, etc.,

MARK H. JUDGE,

A.R.I.B.A., Fellow Sanitary Institute.

7, Pall Mall,
February 17th, 1900.

APPOINTMENTS.

- Adams, J. D., M.D. St. And.**, reappointed M.O.H. of Yeovil Rural Sanitary District.
- Arbuckle, John H., M.D. Glasg., D.P.H. Camb.**, appointed M.O.H. of Kilmarnock.
- Berry, H. Poole, M.B. Lond., M.R.C.S.**, reappointed M.O.H. of the Borough of Grantham.
- Coles, A. C., M.D. Edin., B.Sc.**, reappointed M.O.H. of the Winton Urban Sanitary District.
- Gregg, J. L., M.B., B.S., N. Zeal.**, appointed M.O.H. of the Shire of Mansfield, Victoria, Australia.
- Healy, J. J. S., L.R.C.P., L.R.C.S. Edin., L.F.P.S. Glasg.**, appointed M.O.H. of the Shire of Phillip Island and Worlaunai, Victoria, Australia.
- Harris, S. C., L.F.P.S. Glasg.**, appointed M.O.H. of the Ely Urban Sanitary District.
- Jones, U. W., M.D. Edin.**, appointed M.O.H. Galliguer and Rhigos Rural Sanitary District.
- Murison, Patrick, M.B., C.M. Edin., L.R.C.P. Lond.**, appointed M.O.H. of the County of Sutherland.
- Porter, Charles, M.D., D.P.H.**, appointed M.O.H. of the County of Shropshire.
- Riddell, Robt., M.B., C.M. Edin.**, appointed M.O.H. of Sandbach Urban Sanitary District.
- Skinner, Stephen, M.B., C.M. Aberdeeu**, reappointed M.O.H. of Clevedon (Somerset), Urban Sanitary District.
- Weld, J. C., L.K.Q.C.P. Irel.**, appointed M.O.H. of Carisbrook, Victoria, Australia.
- Webber, Wm. W., L.R.C.P. Edin., M.R.C.S. Eng.**, reappointed M.O.H. of the Crewkerne Urban Sanitary District.

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PUBLIC HEALTH:

The Journal of the Incorporated Society of
Medical Officers of Health.

VOL. XII. No. 7.

APRIL, 1900.

EDITORIALS.

REGISTRATION OF HOUSES LET IN LODGINGS.

A REPORT lately presented by the Public Health Committee of the London County Council dealing with this subject has brought into prominence a question which is of importance to authorities other than metropolitan. Under existing legislation extra-metropolitan authorities are empowered (Public Health Act, 1875, Sec. 90, as amended by Section 8 of the Housing of the Working Classes Act, 1890), and metropolitan authorities are required (Public Health (London) Act, 1891, Sec. 94), to make bye-laws for regulating certain matters in connection with houses "let in lodgings or occupied by members of more than one family." In neither Act is there an authorization to prescribe any limit-rentals for lodgings or tenements to which such bye-laws are to apply, the provisions being, according to the sections referred to, applicable to every such house without distinction. It is, however, customary, and we even think expedient, to prescribe such limits (in the form of exemption clauses), as there are many lodging-houses which do not require municipal control. Unfortunately, the Local Government Board have sanctioned in certain metropolitan districts exemption clauses so drafted as to favour the neglect of the valuable powers conferred by the Act. Two such clauses or bye-laws have been enacted, very closely similar in form. One, which is in force in several districts, reads as follows:

A lodging-house shall be exempt from the operation of these bye-laws until the landlord of such lodging-house shall have been required (in pursuance of a subsequent bye-law) to furnish the statement of particulars (therein mentioned).

The second, at the present time in force in Bethnal Green, is as follows:

These bye-laws shall not apply to a lodging-house if and so long as the Vestry deem it unnecessary to register such lodging-house. The Vestry may on sufficient cause cancel any entry on

the Register, and may from time to time proceed afresh with regard to any lodging-house which they have previously deemed it unnecessary to register or the registration of which has been cancelled.

The enacting of bye-laws for the registration of lodging-houses, both in London and in the provinces, is effected under Section 182, *et seq.*, of the Public Health Act, 1875. In the first-named section there is the important proviso that "no bye-law made under this Act by a local authority shall be of effect if repugnant to the laws of England or to the provisions of this Act"—"this Act" referring in the present case to that of 1891 as well as to that of 1875. Section 94 of the former Act enacts that "every sanitary authority *shall make and enforce* such bye-laws as are requisite" for the purposes of registration. It appears to us that the bye-laws which we have quoted above, inasmuch as they give to the local authority a discretionary power not provided by the Public Health (London) Act, 1891, are distinctly "repugnant" to that Act. We are more than surprised that the Local Government Board should have sanctioned such bye-laws. The London County Council have made inquiry as to the extent to which registration has been carried out in the Metropolis, and have found that in Bethnal Green the Act is practically a dead-letter *quâ* registration.

On complaint being made to the Local Government Board in the manner provided for by the Act of 1891, that Board replied that the bye-law in question gave the local authority a discretionary power, which power had been exercised. The Council have determined to test the validity of the bye-law, and are taking the necessary steps towards that end.

SALE OF SKIM MILK: NEED OF LABEL.

On March 23rd, at Marylebone Police Court, Thomas Crook was summoned by the Vestry of Paddington for selling milk deprived of 23 per cent. of the normal amount of butter-fat, and was fined £2 with 12s. 6d. costs. There was a second summons for exposing for sale and selling "skimmed milk" from a receptacle not bearing a label "Skimmed Milk," contrary to the provisions of Section 11 of the Sale of Food and Drugs Act, 1899, on which he was fined 10s., with 2s. costs. The second summons was based on an independent sample sold as "skim milk." A few days previously a case was taken by the St. Giles's Board of Works at Bow Street, under the same section, but the point was not argued, as it was held that a declaration in the terms which decided the case of *Spiers and Pond v. Bennet** precluded proceedings against the defendant.

* (1896) 2 Q.B., 65; 60 J.P., 487.

We have thought it of interest to call attention to these cases because the decision in the Paddington case is against the interpretation which we placed on Section 11 when we discussed the Bill and Act in our earlier issues.* The section reads as follows:

Provisions as to condensed separated or skimmed milk.

11. Every tin or other receptacle containing condensed separated or skimmed milk must bear a label clearly visible to the purchaser on which the words "Machine-skimmed Milk" or "Skimmed Milk," as the case may require, are printed in large and legible type, and if any person sells or exposes or offers for sale condensed separated or skimmed milk in contravention of this section he shall be liable. . . .

It appeared to us that it was not possible to separate the word "condensed" from the two classes of milk mentioned, viz., "separated" and "skimmed," and that the section was, therefore, intended to refer solely to "condensed separated" and "condensed skimmed" milks. We were strengthened in that opinion by the fact that the Food Products (Adulteration) Committee in their Report of 1896 recommended that such condensed milks should be distinctly labelled in this way, but made no such recommendation with regard to ordinary separated or skimmed milk. We may mention here that when the St. Giles's case was before the Magistrate, Mr. Ricketts, who appeared for the defendant, was prepared to argue that the section applied only to condensed milks. It is, however, worth noting that, so far as we have been able to learn, the milk trade have adopted the view that the section applies to ordinary separated and skimmed milks, and that wholesale vendors now mark receptacles containing such milks in accordance with that reading of the section.

The decision given above, being that of a Court of First Instance, is not binding on any other Court, and we shall be interested to learn what interpretation will be placed on the section by the Appeal Court, as the matter is bound to get there before long. We shall be glad in the meantime to hear from our readers what the practice is in various parts of the country.

ROYAL MASONIC INSTITUTION FOR BOYS.—Among the candidates for the April election is a son of the late F. W. Skrimshire, M.R.C.S., formerly Medical Officer of Health of Morpeth. The candidate is No. 36 on the April list. Proxies for this candidate will be gladly received by the Editor.

* See PUBLIC HEALTH, xi., p. 597 (June, 1899), and xii., p. 14 (October, 1899). In the latter case we note that a comma has inadvertently crept in after "condensed" in line 6 of paragraph 3.

THE RISKS ATTENDING THE USE OF CARBURETTED WATER-GAS FOR DOMESTIC LIGHTING PURPOSES.*

By JOHN HALDANE, M.D., F.R.S.,

Lecturer in Physiology, University of Oxford.

DURING the last few years, what is technically known as carburetted water-gas has been very generally introduced in the United States instead of ordinary coal-gas for domestic lighting and heating purposes. A partial change in the same direction has been and is being carried out in many towns in this country,† and has given rise to a good deal of uneasiness, on account of the real or supposed risks of poisoning by water-gas. The subject is therefore one of some interest from a public health point of view. It was recently investigated by a Home Office Departmental Committee,‡ of which I was a member.

As is well known, ordinary coal-gas is made by heating coal in fire-clay retorts. The gas driven off from the coal is conducted by pipes to condensers and purifiers, where it is freed from tarry vapours, sulphuretted hydrogen, ammonia, carbonic acid, and other impurities, and then passed on to a gas-holder for storage. The purified gas is a complex and somewhat variable mixture, consisting of about 50 per cent. of hydrogen, 35 per cent. of marsh-gas (CH_4), 7 per cent. of carbonic oxide (CO), 4 per cent. of ethylene (C_2H_4) and other hydro-carbons, and a little nitrogen.

Carburetted water-gas is usually made as follows:—A tower-shaped furnace known as the “producer” is filled with coke. This is first blown up to a white heat with a blast of air. The air-blast is then turned off, and steam driven through the coke. The steam is decomposed according to the reaction $\text{C} + \text{H}_2\text{O} = \text{CO} + \text{H}_2$, and the mixture of carbonic oxide and hydrogen which issues is ordinary “water-gas.” This has a non-luminous flame when burnt, and would therefore be useless for lighting purposes except with incandescent burners. The water-gas is therefore passed on to a further chamber or pair of chambers (the “carburetter” and “super-heater”), where it is “carburetted.” The carburetter is a fire-

* Read before the Incorporated Society of Medical Officers of Health, February, 1900.

† See p. 545 for a list of gas undertakings in this country supplying water-gas.

‡ The Report of the Committee was published as a Blue-book in 1899.

brick chamber, kept at a red heat by the gases from the producer, into which, while the water-gas is passing, petroleum oil is injected. The oil is “cracked,” or converted into gas, by the heat, and the gas so formed mingles with the water-gas. The final mixture which issues from the carburetter and super-heater has a luminous flame when burnt, and is known as carburetted water-gas. The lighting and heating power of this gas varies with the proportion of oil used. It has very much the same smell as ordinary coal-gas, and consumers would not know the difference. The working of a carburetted water-gas plant is extremely simple in practice, but of course steam and air must be alternately blown through, as the coke would rapidly cool if the steam were continued too long. The gas is purified in the same way as coal-gas, but the process of purification is somewhat simpler. The purified gas contains about 35 per cent. of hydrogen, 30 per cent. of carbonic oxide, 20 per cent. of marsh-gas, 10 per cent. of ethylene, etc., and a little nitrogen.

In this country there does not appear to be much difference as regards cost between coal-gas and carburetted water-gas, the difference which exists depending largely upon local conditions. It appears, however, to be often advantageous to use the water-gas process as a supplement to coal-gas manufacture. The water-gas plant takes up little space, is relatively inexpensive, and can be set in action on any emergency, such as a bad fog, with great rapidity as compared with coal-gas plant. The number of men required is also much smaller, so that with water-gas plant a strike could be more easily met. In the United States the relative prices of gas-coal, petroleum, and anthracite suitable for making water-gas would appear to have led to the general introduction of carburetted water-gas. In most of the large towns ordinary coal-gas has almost ceased to be made.

Both coal-gas and water-gas are, of course, poisonous even when largely diluted with air, and according to the general opinion of toxicologists the poisonous constituent is in each case carbonic oxide. The Departmental Committee were, however, confronted with opinions expressed by various chemists that other constituents besides carbonic oxide cause or contribute to the poisonous effects of coal-gas. They therefore asked Dr. Lorrain Smith, of Queen's College, Belfast, to carry out a series of precise experiments on the subject with the coal-gas and carburetted water-gas made in that town. These experiments, which are described in Appendix VII. of the Committee's Report, leave no room for doubt that the poisonous effects of both coal-gas and carburetted water-gas are due to the carbonic oxide alone. The other constituents are perfectly

harmless in comparison, and contribute nothing to the poisonous effects.

As regards the mode of action of carbonic oxide, it has of course been well known since the publication of Claude Bernard's classical researches on the subject that this gas enters into combination with the hæmoglobin of the blood to the exclusion of oxygen. The most probable explanation of its poisonous action was, therefore, that it caused death by interfering with the oxygen supply to the tissues. This explanation was on various grounds doubted by some investigators, but four years ago I was able to prove its correctness by the following experiment:—An animal was placed in a strong glass vessel, into which pure oxygen was first driven to a pressure of two atmospheres. At this high pressure sufficient oxygen, as both previous calculation and the actual result of the experiment showed, goes into simple solution in the arterial blood to support life quite apart from the oxygen-carrying power of the hæmoglobin. Carbonic oxide was then forced into the vessel to a pressure of a whole extra atmosphere, but the animal was hardly affected, although on killing it inside the vessel its hæmoglobin was found by analysis to be completely saturated with carbonic oxide. The conclusion is evident that the poisonous action of carbonic oxide is due solely to its property of combining with hæmoglobin and thus interfering with the oxygen supply to the tissues. This conclusion was further confirmed by the observation that carbonic oxide had no action at all on invertebrate animals which are not provided with hæmoglobin.

To measure accurately the extent to which blood is saturated with carbonic oxide I devised the following method, which depends upon the fact that normal blood, when sufficiently diluted with water, has a yellow colour, whereas blood saturated with carbonic oxide forms a pink solution when similarly diluted. A solution of about 1 of normal blood to 100 of water is made; also a solution of carmine dissolved with the help of a little ammonia, and diluted till its *depth* of tint is about the same as that of the blood solution. Two test-tubes of equal diameter (about half an inch) are then selected. Into one of these 5 c.c. of the blood solution are then poured with a pipette; into the other about an equal quantity is poured. Ordinary lighting gas is then allowed to blow into the second test-tube through a piece of rubber tubing for a few seconds. The test-tube is then quickly closed with the thumb before the gas has time to escape, and the blood solution thoroughly shaken up with the gas for a few seconds. The hæmoglobin is thus completely saturated

* *Journal of Physiology*, vol. xviii., p. 201; and vol. xxi., p. 161.

with carbonic oxide, and the solution has now the characteristic pink tint. The carmine solution, which has a still pinker tint, is now added from a burette to the 5 c.c. of normal blood solution in the other test-tube until the tints are the same in the two test-tubes. Not only, however, must the tints be equal in *quality*, but they must also be sensibly equal in *depth*. If the carmine solution is too strong or too weak, the latter will not be the case, and the solution must be diluted or made stronger accordingly. It is usually easiest to make the carmine a little too strong at first, so that on adding both carmine solution and water equality can be established. From the amount of water which required to be added it is easy to calculate the extent to which the original carmine solution needs to be diluted. The solutions are now ready for use, and the actual analysis is made as follows:—5 c.c. of the solution of normal blood are measured into one of the test-tubes, and a drop of the suspected blood placed in the other test-tube and cautiously diluted with water till its *depth* of tint is about equal to that of the normal solution. If carbonic oxide be present in the hæmoglobin, a difference of quality in the tints of the two solutions will now be clearly perceptible. Carmine solution is then added from the burette to the normal blood, and water, if necessary, to the abnormal blood, till the tints are equal in both quality and depth. The carmine is added by about 0.2 c.c. at a time, the points being noted at which there is just too little and just too much carmine, and the mean being taken. The solution of abnormal blood is then saturated with coal-gas, and the addition of carmine to the other test-tube continued until equality is again established, and the amount of carmine noted. The percentage saturation with carbonic oxide of the abnormal blood can now be easily calculated, since we know how much carmine solution its saturation represented as compared with what complete saturation represented.

The method of calculation is illustrated by the following example: To 5 c.c. of normal blood solution, 2.2 c.c. of carmine is required to be added to produce the tint of the blood under examination, and 6.2 c.c. to produce the tint of the same blood fully saturated. In the former case the carmine was in the proportion of 2.2 in 7.2, and in the latter of 6.2 in 11.2. The percentage saturation (x) of the hæmoglobin with carbonic oxide is thus given by the following proportion sum:

$$\begin{array}{l} 6.2 \quad 2.2 \\ 11.2 : 7.2 :: 100 : x ; \end{array}$$

x is therefore = 55.2. As the compound of carbonic oxide and hæmoglobin is to a slight extent dissociated when the blood is

diluted with water, the value found is a little too low. The corrections needed are as follows: Add 0.5 if 30 per cent. saturation be found, 1.1 if 50 per cent., 1.6 if 60 per cent., 2.6 if 70 per cent., 4.4 if 80 per cent., 10.0 if 90 per cent. Thus, in the above example, we must add 1.3, so that the true saturation is 56.5 per cent. In comparing the tints the test-tubes should be held up against the light from a window, but bright light should be avoided as much as possible, as it increases the dissociation. Failing daylight, an incandescent burner with a chimney of blue glass and an opal globe may be used as the source of light.

When only a rough quantitative estimate of the percentage saturation is required, as in ordinary post-mortem examinations or in examining the blood of a patient suffering from gas-poisoning, all that is necessary is to prepare in three test-tubes of even size (1) a solution of normal blood, well diluted; (2) some of the same solution saturated with coal-gas; and (3) a solution of the suspected blood diluted to the same *depth* of colour as the other two solutions. One can then tell roughly by the relative pinkness of the suspected blood to what extent it is saturated. No other known test for carbonic oxide in blood approaches in delicacy, accuracy, and simplicity that just described. The spectroscopic test, for example, is useless if the blood is less than about 50 per cent. saturated. The normal blood required may easily be obtained from a prick of the finger.

Distinct symptoms of CO poisoning do not begin to appear until the blood is about a third saturated.* The first noticeable symptom is a tendency to dizziness or fainting on exertion. At 50 per cent. saturation the smallest exertion may cause fainting, and mental power is much affected, though in different ways in different persons. Often enough, apparently, a man under the influence of CO behaves almost as if he were drunk. Beyond 50 per cent. saturation the symptoms become more and more alarming, and at death the saturation usually found is about 70 or 80 per cent. Sometimes, however, it is not more than 60 per cent., while occasionally it is as high as 85 per cent.†

As little as 0.2 per cent., or even less, of CO in air is sometimes fatal to animals, but usually 0.4 per cent. is required to cause death unless the exposure be very prolonged. There is every reason to believe that the same holds good for men.

To understand the phenomena of CO poisoning it is necessary to

* *Journal of Physiology*, vol. xviii., p. 430.

† Haldane, "Report to the Home Secretary on the Causes of Death in Colliery Explosions and Fires, 1896": Lorrain Smith, *British Medical Journal*, 1899, vol. i., p. 780.

bear in mind that although the compound of CO with hæmoglobin is relatively stable, yet oxygen in sufficient excess can to a greater or less extent prevent its formation, or drive out the CO already combined. Thus, hæmoglobin brought into intimate contact with air containing 0.07 per cent. of CO will finally reach a state of equilibrium in which it is saturated to an equal extent with CO and oxygen. If the percentage of CO or oxygen in the air be increased or diminished, there will be an exactly corresponding increase or diminution in the *relative* share of the hæmoglobin which either gas obtains. Air containing $2 \times 0.07 = 0.14$ per cent. of CO will, for instance, produce two-thirds saturation with CO, and one-third saturation with oxygen, and so on. In the living body the proportion of CO taken by the hæmoglobin from respired air containing a given percentage of CO is not so large as outside the body, about 0.1 per cent. of CO in the air breathed being necessary to produce half-saturation of the hæmoglobin.* The general law of absorption is, however, much the same, and it follows that there is a certain maximum of saturation for each percentage. With less than 0.05 per cent. of CO in the air this maximum does not exceed 33 per cent. saturation, and the corresponding symptoms are scarcely appreciable, except on muscular exertion. With more than about 0.2 per cent. the maximum exceeds 60 per cent. saturation, and life then begins to be endangered. With normal breathing and about 0.1 per cent. of CO in the air the maximum is reached in about one and a half to two hours, but with more than 0.2 per cent. of CO the danger point will be below the point of maximum absorption, and the time required to reach it will become shorter and shorter in direct proportion to increase in the percentage of CO in the air.

In recovery from CO poisoning the CO is driven out from the hæmoglobin by the oxygen of the air, and escapes in the breath. It is not oxidized in the body.† An hour's breathing of fresh air will suffice in man to remove any dangerous excess of CO from the blood, and after three hours the blood is nearly free, although the damage done to the brain, heart, and other tissues during their partial deprivation of oxygen may cause persistent symptoms and often death. Recovery from even slight CO poisoning is usually accompanied by severe headache, lasting for many hours, and often associated with nausea or vomiting.

* A careful study of this phenomenon by Dr. Lorrain Smith and myself has led us to the conclusion that the oxygen tension of the blood leaving the lungs is higher than that of the alveolar air, and that the absorption of oxygen by the lungs is an active process, not due to mere diffusion. Cf. *Journal of Physiology*, vol. xxii., p. 231, 1897.

† *Journal of Physiology* vol. xxv., p. 225, 1900.

The detection and determination of small percentages of CO in air was formerly a matter of great, and often almost insuperable, difficulty. I have recently, however, introduced a simple, and I think very satisfactory, method, depending on the already described action of CO on blood solution in presence of air.* The sample of air is collected in a clean and dry bottle of about 4 oz. capacity. The cork of the bottle is removed in the laboratory under a 0.5 per cent. solution of blood, and about 5 c.c. of the air allowed to bubble out, a corresponding volume of the blood solution entering. The cork is then replaced, covered with a cloth to keep off the light, and shaken continuously for about ten minutes, when the haemoglobin will have reached the point of saturation corresponding to the percentage of CO present. The solution is then poured out into a test-tube, and the saturation determined with carmine solution in the manner described above. It is evident that as in each case the saturation found corresponds to a definite percentage of CO in the air, it is easy to calculate this percentage. If p be the percentage required, and s the percentage saturation found, p is calculated from the following formula:

$$p = \frac{s \times 0.07}{100 - s}.$$

Thus, if $s = 60$, p is 0.105. This method may also be used for the direct determination of carbonic oxide in lighting-gas. The latter must, however, be first diluted to $\frac{1}{100}$ (or with carburetted water-gas to $\frac{1}{100}$) with air. As it is quite easy to make this dilution with perfect accuracy, the method is an exact one, and is not only rapid, but avoids the difficulties and sources of error connected with the ordinary method of determination by cuprous chloride, or by explosion. The apparatus which I use for the purpose is on the table.

I now come to the question of the risks connected with carburetted water-gas. First of all, the risks connected with its manufacture may be dealt with. Of course, water-gas is more poisonous than coal-gas, and, other things being equal, the risks of poisoning to a workman would be greater. Such increased risk as might exist can, however, easily be avoided, particularly as the plant used requires very little unskilled labour, and is under the constant and immediate control of skilled engineers, so that dangerous escapes of gas are very improbable. So far as I have been able to judge, both from the evidence brought forward before the Departmental Committee and from independent personal inquiry,

* *Journal of Physiology*, vol. xxii., p. 478, 1898.

the employment of the men engaged in the manufacture is, according to all ordinary standards, a safe and healthy one in actual practice.

As regards the risks to the public who use carburetted water-gas, the case is very different. By far the clearest evidence on this subject is obtained from the statistics of gas-poisoning in American towns, where undiluted carburetted water-gas is to a large extent used. A valuable summary of these statistics is given by Dr. Parsons in Appendix No. II. of the Water-Gas Committee's Report; while further important data are contributed in Appendix No. VI. by Mr. A. C. Humphreys, a very eminent American gas engineer. The clearest statistics are those of Boston, where, in accordance with an Act passed by the Legislature in 1888, the accidents from illuminating gas are annually reported by the Massachusetts Board of Gas and Electric Light Commissioners.

The following table, given in a letter by Mr. W. S. Allen, formerly Secretary to the Board, shows the effects of the introduction of water-gas, as shown by the Board's records since June, 1888:

Year.	Population.	Cubic Feet of Gas sold.	Percentage of Carburetted Water-gas.	DEATHS FROM GAS INHALATION.		
				Reported as		Total.
				Accidental.	Suicidal.	
1888	...	1,513,000,000	1.0	0	0	0
1889	...	1,643,000,000	1.5	1	0	1
1890	448,778	1,761,000,000	8.0	4	2	6
1891	...	1,859,000,000	32.0	7	2	9
1892	...	1,844,000,000	52.0	5	8	13
1893	...	1,700,000,000	67.0	17	6	23
1894	...	1,708,000,000	88.0	16	10	26
1895	496,920	1,875,000,000	90.0	16	8	24
1896	...	2,263,000,000	89.0	31	17	48
1897	...	2,354,000,000	93.0	32	15	47

The table on the next page, which I drew up for the Water-Gas Committee from all the available data, further illustrates the effects of introducing carburetted water-gas.

These statistics bring out two points, one being that coal-gas is an extraordinarily safe illuminant, so far as risks of poisoning are concerned; the other, that the loss of life from poisoning is fully a hundred times as great with undiluted carburetted water-gas as with coal-gas. Of the deaths so caused only about half are accidental, the rest being chiefly suicidal, although a few are homicidal.

The risk of poisoning in the American towns supplied with carburetted water-gas is certainly very appreciable. Assuming that

gas mixes with the air of the room; and (4) the percentage of CO in the gas. As regards the first three of these factors, our existing knowledge was very defective, and accordingly I undertook to investigate them in connection with the work of the Committee.

With respect to the first factor, the following table shows the rates of escape from a set of the most commonly used burners—Bray's "enamel regulator"—the tap being turned full on, and the pressure being 1·7 inches of water, which is about the ordinary night-pressure. On examining various taps I found that about the maximum flow of gas from the burner was given through an angle of from 60 to 80 degrees out of the 180 degrees through which the taps turned between the two stops, so that, in the event of a tap being accidentally turned on, the chances are very considerable that the maximum outflow will occur:

Number of Burner.	1	2	3	4	5	6	7	8
Escape in cubic feet per hour ...	5·5	6·1	7·5	8·2	9·5	11·0	11·8	14·8

It will be noted, for instance, that a No. 4 burner, which is meant to burn about 4 feet of gas per hour, will pass twice this quantity if the gas is unchecked, even at the low night-pressure.

As regards the rate of ventilation of ordinary closed rooms, I made a very large number of experiments in various kinds and sizes of rooms. The methods employed were two. In the first series gas was allowed to escape from an ordinary jet at a known rate, measured by a meter, into the room, the conditions being such that the gas mixed thoroughly with the air of the room, as shown by the equality in the percentages found near the roof and near the floor. Samples of the air were taken at intervals, until a point was reached at which the percentage of gas ceased to increase. It was then of course easy to calculate by a simple proportion sum the rate at which air was entering or leaving the room. In the second series four candles—weighed at the beginning and end of the experiment—were placed on the floor, lighted, and allowed to burn until the percentage of CO₂ in the air became constant. The amount of CO₂ produced per gramme of candle burnt had been previously determined in an animal respiration apparatus, so that the rate of ventilation could be calculated from the analyses as before. Nearly 200 analyses were made, the gas analysis apparatus used being that which I recently described in the *Journal of Physiology*, vol. xxii., p. 465, 1898, and which is extremely convenient for public health work, as the method is both rapid and accurate, and a sample collected in a 2 oz. medicine bottle is sufficient for a double analysis.

As might have been expected, I found that the rate of inflow of air varied with the amount of wind outside, the difference of

temperature between outside and inside, and other conditions. Thus, with a good breeze the rate of inflow was about doubled. An open fireplace, with no fire burning, about doubled the rate of inflow in a room of 1,400 cubic feet, while a fire burning increased the ventilation ten times. With a difference of temperature of 18° F. between inside and outside, the ventilation was increased three times by opening the lower sash of the window 4 inches. With increasing size of room the rate of inflow—other things being equal—increased about in proportion to the increased surface of wall, floor, and roof, and not in proportion to the size of the room. This result is, I think, one of special interest, as showing that the value of "cubic space per person" in a large room with "natural ventilation" is quite different from that in a small room. For instance, in a small bedroom of 500 cubic feet capacity, with all openings closed, the natural ventilation through walls, etc., would amount to 280 cubic feet per hour, whereas in a large room of 30,000 cubic feet it would be only 70 cubic feet per hour for each 500 cubic feet of capacity. Thus, in large rooms or halls, which, when crowded, often only afford about 200 cubic feet per person, special means of ventilation become almost a necessity. It is in large, and not in small, rooms that one finds air which contains a large excess of CO₂. In the worst class of one-roomed dwellings, with an average of 1,400 cubic feet per room and 212 cubic feet per person, Carnelley and I found an average of only 6·6 volumes per 10,000 in excess of outside air, although the samples were all taken in the middle of the night. In churches and other badly-ventilated buildings one commonly finds from five to ten times this excess.

The following table, calculated from the results of the experiments, shows the time required for a volume of air equal to that of the room to enter, door, window, and fireplace, if any, being closed, and there being no wind and not more than a few degrees of difference of temperature between inside and outside—in other words, the conditions for natural ventilation being most unfavourable:

Cubic Capacity of Room in Cubic Feet.	Time in Hours required for a Volume of Air equal to that of the Room to enter.
500	1·8
750	2·1
1,000	2·3
1,500	2·65
2,000	2·9
3,000	3·3
4,000	3·6

A house with stone walls gave very much the same result as a house with much thinner brick walls, so that it seems probable that as regards the facility with which air permeates inwards and outwards there are, as a rule, not very great differences between the rooms in different houses. Of course, however, there must be exceptional cases. In the cabin of a ship, for instance, the walls, roof, and floor must be almost air-tight, except in so far as ventilation is specially provided for.

I now come to the third factor—the degree of completeness with which gas escaping from a jet mixes with the air of a room. It is evident that the escaping gas must at first ascend, since its specific gravity is only about half that of air. What afterwards becomes of it? It might simply pass bodily out through the porous ceiling without previous mixture; it might be brought rapidly down from the roof and thus thoroughly mixed with the air of the room by convection currents; or it might mix slowly with the air below by simple diffusion downwards; or, finally, it might do more than one of these things at the same time. For the person sleeping in the room, what actually occurred might be a matter of life and death. The experiments showed that the behaviour of the gas depended entirely on certain definite circumstances, and that in the case of an actual escape sometimes one result and sometimes another followed.

When there was only a very slight difference of temperature between inside and outside, as was usually the case by day, except in winter, the gas escaping from a jet was found to remain almost entirely near the roof, and not to come down to any considerable extent. After a time the escape of gas through the ceiling, etc., became equal to the escape from the burner, so that no further gas accumulated. As an example of this kind of result I may take experiment No. 7 (Appendix No. 1 of Report), in which, after an escape of four hours' duration from a No. 7 burner in a room of 1,100 cubic feet capacity, I found 2·82 per cent. of gas near the roof, and only 0·20 per cent. at 3 feet from the floor. The analysis brought out a further interesting point, namely, that the gas present near the floor consisted almost entirely of hydrogen, while the gas near the roof was less rich in hydrogen than the original gas. Evidently the constituents of the original gas had to a large extent separated by diffusion in the room, and as the hydrogen is by far the most diffusible constituent, it had diffused downwards most rapidly.

At night, on the other hand, when the outside temperature was considerably lower than that inside, the usual result was that the

gas soon became mixed equally throughout all parts of the room. Investigation showed that this was due to convection currents down the cold windows. The gas in the room was also on the whole less rich in hydrogen than the original gas, as some of the hydrogen had diffused out through the walls, etc. The circumstance that at night the gas usually comes down from the roof and mixes with the air below is evidently an unfortunate one so far as the chances of escape for a person sleeping in the room are concerned.

Another peculiar fact discovered with regard to gas-escapes was that when the escape was a very large one there was much less tendency for the gas to come down from the roof, even at night. Thus in one experiment, after an escape of 50 cubic feet per hour for two hours from a bracket from which the burner had been unscrewed, there was only 0·86 per cent. of gas at 3 feet from the floor, although there was 8·23 per cent. at the roof. Even on a cold night, after a similar escape of five hours' duration, there was only 2·36 per cent. at 3 feet with 8·32 per cent. near the roof. When there is a large accidental escape of gas in a room, as from pulling down too far a sliding chandelier from which the water has partially evaporated, it is often the person sleeping in the room above who is poisoned, and the results first referred to make it easy to understand this fact. I may add that I never succeeded in producing an explosive atmosphere in any part of a room by an escape from a burner, although when the burner was taken off the air near the roof soon became explosive.

I may now proceed to the consideration of the fourth factor, namely, the percentage of carbonic oxide in the gas. The following table, which is calculated from the data already given above,

Size of Room in Cubic Feet.	Outflow of Gas in Cubic Feet.	Size of Bray's Burner.	Final Percentage of CO in Air with escaping Gas containing					
			5 per cent.	10 per cent.	15 per cent.	20 per cent.	25 per cent.	30 per cent.
500	9·1	4	0·16	0·33	0·49	0·66	0·82	0·98
750	9·1	4	0·13	0·25	0·38	0·51	0·76	0·89
1,000	10·6	5	0·12	0·24	0·36	0·48	0·60	0·72
1,500	12·3	6	0·11	0·22	0·33	0·44	0·55	0·66
2,000	13·2	7	0·09	0·19	0·28	0·38	0·47	0·56
3,000	13·2	7	0·07	0·14	0·21	0·28	0·35	0·42
4,000	13·2	7	0·06	0·12	0·18	0·24	0·30	0·36

shows the *maximum* percentages of CO which are likely to accumulate in rooms of different sizes with continuous escapes of gas occurring under the most unfavourable conditions as regards ventilation, etc., with varying proportions of CO in the gas. The percentages in italics (from .2 to .4 per cent.) would be dangerous, and those in thick type (above .4 per cent.) would probably prove fatal. The escapes would, of course, need to continue for two or three hours before the percentages specified were actually reached.

A glance at this table will explain at once the greatly increased risk of poisoning when carburetted water-gas is used, and the, at first sight, anomalous fact that although there is only about four times as much carbonic oxide in carburetted water-gas as in coal-gas, yet the increase in the number of deaths from poisoning is enormously greater than four times when the former kind of gas is used. On examining the statistics of towns using pure coal-gas, pure carburetted water-gas, and mixtures of the two, I calculated that, roughly speaking, the risk of accidental poisoning increases with the cube of the relative increase in the percentage of CO.

I must now refer shortly to poisoning cases which occur through escapes of gas into houses from broken mains or service pipes. These breaks seem usually to occur after some disturbance of the ground caused by digging up the street, and sometimes from the passage of steam-rollers. Very large volumes of gas may thus escape into houses, with most serious effects to the inhabitants. Since the researches of Pettenkofer on this subject, it has also been well-known that the gas may, to a greater or less extent, be deodorized in passing through the ground, with the result that the true cause of the illness or death caused by the escape is not recognised. When carburetted water-gas is used, escapes from mains are specially serious, and large numbers of persons may be affected. Thus, to take one instance recorded in Boston in 1887, about a hundred persons, occupying the blocks of houses on either side of a street in Boston, were more or less overcome by an escape of gas from a broken main. By good fortune the escape was discovered by a man who came home at about 2 a.m., and the people in the houses were soon rescued, only one being already dead.

As regards the use of carburetted water-gas in this country, in only one case has it been distributed unmixed for any length of time. This case was the notorious one of the Garston District on the outskirts of Liverpool, where the Liverpool Gas Company distributed it without warning of any kind for about a year, with the result that the proportion of fatal and non-fatal poisoning cases in the district was about the same as in Boston. A most effective

protest by Surgeon-Lieutenant-Colonel Cayzer* brought the dangers of water-gas prominently before the public, and quickly led to a discontinuance of the supply at Garston. In many other towns, including London, a certain proportion of carburetted water-gas—usually less than a fourth—is distributed along with the coal-gas.† As regards the relative number of poisoning cases in towns where carburetted water-gas is used mixed with coal-gas, I came to the conclusion, after examining the records for the last three years, that, as shown in the table of statistics, there is a most distinct increase. Nevertheless the total number of cases is very small. In one or two towns or districts, notably Belfast and Tottenham, the proportion distributed has been considerable. In Tottenham a 50 per cent. mixture has been distributed for several years, and no fatal accidents have been reported. In Belfast, however, where the proportion is variable, running up to 60 per cent., or, according to another statement, to 70 per cent., at times, the number of both fatal and non-fatal accidents has been considerable. During the last two years there have been eight or nine fatal accidents, which, considering the population of Belfast, is far above the ordinary proportion with coal-gas. The Belfast Coroner has again and again drawn attention to the subject during the last few months in connection with inquests.

There is at present nothing in the Acts of Parliament relating to gas distribution to prevent the distribution, without warning of any kind to the public, of either carburetted water-gas or any other mixture of gases suitable for lighting purposes. Of course, however, it would be contrary to the interests of either a gas company or a corporation to distribute any kind of gas which would cause complaint; and in this country, at least, this is, perhaps, a pretty effective safeguard against the distribution of a dangerous kind. Nevertheless we are confronted with the case of the United States, where some hundreds of lives are annually sacrificed by water-gas poisoning, in spite of every protest. To give an idea of the anxiety sometimes caused in American households by the use of water-gas, I may mention that the wife of a professor in one of the American Universities recently told me that she every night woke up and went to the nursery simply to see that the gas was not escaping. She said that the newspapers seemed always to be full of gas-poisoning cases.

* See letters in the *Public Health Engineer*, 1897 to 1899. Colonel Cayzer informs me that in each of the two fatal cases at Garston there was an open fire-place in the bedroom. One of the rooms had a capacity of 1,050, and the other of 612 cubic feet.

† See p. 545 of this issue.

The Water-gas Committee came to the conclusion that legislation with regard to water-gas is desirable; and their chief recommendation was "that power should be conferred upon a Central Department to make regulations, enforceable by adequate penalties, limiting the proportion of carbonic oxide in the public gas-supply at night to 12 per cent., or such greater amount as the Department may consider desirable." A 12 per cent. limit, valid only during sleeping hours—say from 10 p.m. to 7 a.m.—would allow of the distribution of a very considerable amount of water-gas; and even by night about 20 per cent. could be distributed.

It may be asked, Why not abolish by law the use of carburetted water-gas altogether? Even in such a small proportion as 20 per cent., it is certainly less safe than coal-gas, and no consideration of expense should weigh against risks to life. It seems to me that an argument of this sort is unsound, and, as a matter of fact, is never followed out in practice. We are constantly exposing ourselves knowingly to small risks, and we must do so unless we make it our object simply to "survive" in the abstract, and not to live our own lives. We are all agreed in thoroughly despising the persons who are constantly thinking of nothing but their own health and safety from danger or disease. Among other things we want light and heat. We get it to a large extent from gas, and we can only get as much as we can pay for. If we need more, and can get it with our available means by taking additional risk, we take the risk unless it is an appreciable one, and we should very much object to being interfered with in doing so by a grandmotherly legislation. The question as regards carburetted water-gas is therefore one of balancing risk to life against other advantages; and for my own part I think that the Committee came to about the right conclusion in striking the balance at a 12 per cent. limit of carbonic oxide. Further, I think they were right to recommend that the limit should be an elastic one, to be relaxed if it seemed desirable, at the discretion of a competent central authority. It is quite possible to overcome the difficulties connected with a safe distribution of carburetted water-gas. Moreover, it is quite conceivable that the relative advantage of carburetted water-gas may become greater in the future than it is at present. For both of these reasons any cast-iron legislation on the subject seems distinctly undesirable.

At the close of his paper Dr. Haldane demonstrated on a sample of blood taken from the body of a man who had died of carbonic oxide poisoning (1) the method of roughly estimating by inspection

of the diluted blood the degree to which the hæmoglobin was saturated with carbonic oxide; and (2) the method of accurately determining the saturation with carmine solution. He also showed an apparatus for the purpose of determining by the blood-method the percentage of carbonic oxide in coal-gas. The apparatus consisted of (1) a sample-tube, provided with a tap at each end, and holding exactly 4 c.c. of gas; (2) a flask holding 400 c.c. of air. The gas from the sample-tube was forced into the flask of air by the pressure of a $\frac{1}{2}$ per cent solution of blood contained in a burette, about 5 c.c. of the blood solution being also forced in. The flask was then closed, disconnected, and shaken for at least five minutes, after which the blood solution was poured out into a test-tube and its saturation with carbonic oxide determined. From the saturation (s) the percentage (p) of carbonic oxide in the air of the flask was calculated according to the formula $p = \frac{s \times 107}{100 - s}$. As the gas in the flask was diluted to $\frac{1}{100}$ th with air, the percentage of carbonic oxide in the original gas was $p \times 100$.

DISCUSSION.

The PRESIDENT said the Society was very much indebted to Dr. Haldane for bringing before them this subject, which had been somewhat neglected by medical officers of health, many of whom probably knew very little about it until the issue of the report of the recent Departmental Committee. The risk was not at present one of great magnitude, but, as the Committee pointed out, it was very important that it should be regulated by legislation before it became unmanageable. In America, for instance, it had possibly become almost too great to be attacked, and it would probably now be impossible to alter the existing state of affairs. The proportion of carburetted water-gas regarded by the Committee as a permissible maximum was very reasonable; but the gas companies would probably not be prepared to alter their present dangerous admixture of water-gas with coal-gas until compelled to do so by legislation. If the danger increased with the proportion of water-gas, it was most important that they should urge Parliament to insist on its reduction to the proportion suggested by the Departmental Committee. Dr. Haldane's paper would bring the matter before medical officers of health throughout the whole country. The simple method of analysis demonstrated to them for the first time that evening would enable each of them to check the amount of water-gas supplied in domestic coal-gas. Dr. Haldane's remarks on ventilation were of extreme interest. The relationship between air capacity and ventilation was one of the most important they had had before them for some time.

Mr. PAKES desired to emphasize the importance of the relationship of ventilation to diffusion. The largest room the air of which he had had the privilege of examining was the Albert Hall, in the middle and at the end of a concert. The amount of carbonic acid found present was 1·8 per 1,000, which bore out Dr. Haldane's statements as to the great difficulty of getting such a place ventilated. Mr. Pakes referred to the panic at Moscow, when the death of a number of children occurred in a crowd in the open air, and he asked Dr.

Haldane whether, in his opinion, it was possible for suffocation to take place in the open air. He thought the method of analyzing demonstrated that evening was easy and accurate.

Mr. BROADBERRY (Tottenham Gas Company) said he was responsible for the distribution of 1,262,000,000 cubic feet of carburetted water-gas mixed with 1,311,000,000 cubic feet of coal-gas, a proportion of about 50 per cent.; but although they started with a lower proportion of carburetted water-gas, they were often now above 50 per cent. They would therefore look upon him as a cold-blooded poisoner. If he had any suspicion that this gas would spread death, he should hesitate to send it out at all. Dr. Haldane had told them that in Boston, U.S.A., 1 in every 300 deaths was due to gas-poisoning. In Tottenham, with a population of 220,000, they had not had one single case where death had been due to this poison, nor had they any illness or trouble of any description resulting from its use since its first distribution, five years and a quarter ago. They had 16,200 supplies, representing about 80,000 to 100,000 consumers of the gas. They attended to about 1,800 complaints of escapes during a year, and no doubt the local gasfitters attended to a great many more. With the enormous number of escapes and of people using the gas, it seemed almost incredible that its use should have been unattended with accident if they accepted what Dr. Haldane had said in his tables and arguments. Of course accidents would happen, and sometimes, perhaps, even from medicine; still, medicine had its proper purposes, and should be used for those purposes. So with gas, it was meant for burning and not for respiration. The supply of carburetted water-gas did not introduce carbonic oxide into a room where it was used. In the manufacture of carburetted water-gas there was far less risk than in the manufacture of coal-gas. He invited any member of the Society to visit their works, and he was sure they would say, in the interests of the workmen, that carburetted water-gas should be used. It was well known that Scotch gas contained twice as much water-gas as English, and he challenged Dr. Haldane to show an increased death-rate due to gas-poisoning in Scotland.

Mr. S. F. MURPHY, in moving that the thanks of the Society be accorded to Dr. Haldane for his paper, said the literature on this subject was scattered through many books and papers, and information could only be collated with great difficulty. Dr. Haldane had given them just this information in his valuable paper. He had put the matter very fairly and clearly before medical officers of health, and no class of officers was more likely to get more useful results from the information supplied than those responsible for advising local authorities. He would not suggest that water-gas should not be used at all, but that it should be used only under limitation. He understood the Local Government Board refused to sanction loans to gas companies because the Board could not enforce this limitation, and they therefore preferred that the companies should obtain their powers direct from Parliament.

Dr. ALLAN seconded the vote of thanks to Dr. Haldane for his paper, which was one of a very high standard, and would give a considerable amount of information to medical officers of health. He believed many medical men had no idea that water-gas was being used to such an extent. Dr. Haldane said, if they wanted to enjoy certain comforts they must run certain risks, but even Mr. Broadberry would admit that if they were prepared to run those risks, they were at least entitled to know what the risks were. The majority of people were unaware that they were using something more than coal-gas in their houses, and

should be apprised of the fact that a very poisonous gas was being freely added to it. It was not fair to compare Tottenham with Boston (U.S.A.). In Tottenham only about a third of the population had gas in their houses, and in many instances it was not laid on all over the house; few probably used gas in the bedrooms by night, and no doubt a considerable number of the cubic feet of carburetted water-gas Mr. Broadberry had referred to would be used in the public streets. Mr. Broadberry said that no deaths had occurred from its use, but Dr. Haldane had shown that small escapes were not fatal. Small escapes of coal-gas produced certain effects on people breathing it for a long time, and breathing water-gas for a long period would have some effect on health, although it might not be such as to come under the notice of the coroner. Mr. Broadberry referred to the Scotch gas; perhaps he would explain why they have given up the use of water-gas in Glasgow?

Dr. HALDANE in his reply, thanked the Society very heartily for their kind reception of his paper. As regards the question referred to by Mr. Pakes, he thought it was hardly possible that the deaths in the crowd at Moscow could have been due to vitiation of the air, and that probably the actual cause of death was mechanical hindrance to the respiratory movements. With regard to Mr. Broadberry's remarks, he would point out that the total quantity of gas sent out by the Tottenham Company during the period referred to was only about one-fifteenth of that sent out by the three London companies in a single year. According to the statistics given in the paper, only three accidental deaths would occur on an average with this distribution of a 50 per cent. mixture of carburetted water-gas and coal-gas. The fact that no deaths had actually occurred was therefore not surprising. In Belfast, however, where there was also a high proportion of carburetted water-gas, the distribution being on a larger scale, there had been for a time a similar immunity from gas-poisoning, yet the proportion of deaths was now above the average. There had been four accidental deaths from this cause within a single week last January. He had no statistics of the actual number of cases of gas-poisoning in Scotland, but judging from newspaper reports, he thought the proportion was a good deal higher than in England. He would point out, however, that in some Scotch towns, such as Edinburgh, the gas was of very high illuminating power, and had to be burnt from small-sized burners to prevent the flames from smoking. This would diminish the risk of accidental poisoning in these towns.

The vote of thanks, on being put to the meeting, was carried unanimously.

Dr. LARDIER (*Revue d'Hygiène*, 1894, 431) instances a case in which a cow dead of anthrax was eaten by a large number of people without the slightest ill-effects. Not so fortunate, however, were those who handled the carcass, which was the cause of a series of fatalities. Two men who helped skin the animal had typical charbon, but recovered. A calf belonging to one of them was seized with the disease and died, and in the removal of its hide another man was pricked, and, in consequence, died. The head of the cow was sold to a woman who wounded herself in cutting it up, and died. The skin of the cow was sold to a man who stored it in a shed on his farm, and a few days later, one of his cows dying of the disease, a post-mortem examination was made, and in the process the operator wounded himself, and died. In addition, from seven to ten cats that ate of the refuse and blood of the original cow all died suddenly shortly afterward.—*American Journal of Medical Science*.

SERUM-THERAPY IN RELATION TO PUBLIC HEALTH.*

By E. G. ANNIS, M.R.C.S.,
Medical Officer of Health of Huddersfield.

THE present decade in medical practice seems to be the age of serum-therapy, for whereas a few years ago nothing whatever was known of this class of treatment, at the present time one is constantly flooded with literature and advertisements concerning all sorts and conditions of sera.

There appear to be, in the first place, at least two distinct objects which we may have in view in the administration of these various sera: one, and the more usual at the present time, is for curative purposes, *i.e.*, the treatment of the disease for which the serum is supposed to be the direct antidote; and, secondly, as a preventive measure, to set up a condition of immunity to a certain disease by the administration of the serum in question. These two distinct uses may be said to have one common basis, for they appear to depend upon the fact that there is to be found in the human system at certain times and under certain conditions an amount of, as it were, food material which will sustain the disease in question, or that the phagocytes in our tissues under certain conditions are not sufficiently active or resistant.

The method of action would appear to be in the one case—that is, as a curative agent—that the serum would act as a strengthener of the phagocytes in their attitude of resistance to the poison, and so tend to stop the course of the disease, and in the other—where used as a preventive of the disease—that it might tend to neutralize or use up the stored food material suitable for the disease, or give to the phagocytes the resistant action which they previously lacked.

This distinctly dual use of the same substance is best illustrated by means of the diphtheria antitoxin, which is now so frequently and successfully used in the treatment of diphtheria. I think it is conclusively proved that by its use alone the death-rate from this disease has been considerably reduced; for whereas in the pre-antitoxin period the case mortality from diphtheria in the Metropolitan Asylums Board hospitals was about 30 per cent., now, under antitoxin treatment, it is reduced to 17 per cent.; and,

* Read before the Yorkshire Branch of the Incorporated Society of Medical Officers of Health, January, 1900.

further, while in the cases of post-scarlatinal diphtheria arising in the same hospitals the case mortality was about 60 per cent., it is now only 5 and 3·7 per cent. in 1896 and 1897 respectively. So also the preventive action of this serum has on several occasions been proved, where, in cases of outbreaks of diphtheria in schools and children's hospitals, the epidemic has been arrested by setting up a passive condition of immunity in those exposed to infection by means of antitoxin injections. This use was especially noted in an epidemic of diphtheria which broke out in one of the large children's hospitals, where 400 children were immunized, and within the next few weeks no further cases of diphtheria arose in the hospital, thus effectively checking the epidemic.

It is also recorded that an epidemic of diphtheria broke out in the town of Bologna amongst a population of 5,500 persons in the worst possible hygienic and dietetic conditions. The first case occurred at the end of October, and fifty-seven other cases quickly followed. Of the fifty-eight cases, fifty-four were treated with serum at the Bologna Antirabic Institute, and there were five deaths, giving a mortality of 8·6 per cent. The epidemic continued, notwithstanding the adoption of severe measures of isolation, disinfection, closure of schools, etc. Therefore, with the consent and at the expense of the municipality, preventive injections of serum were carried out. These injections were made on four-fifths of the children of the poor, between one and twelve years of age, and the results demonstrated very clearly their value both as regards the degree and duration of the period of immunity. When the epidemic was at its height 260 children were treated, and during the next three months only two cases of diphtheria had occurred amongst them. Both cases were slight, one occurring forty days, and the other two months, after the injections. On the other hand, fifteen cases of diphtheria occurred during the same period amongst about the same number of children living under exactly similar conditions, and who were not treated.

The prophylactic uses of the various sera are founded upon the fact that some persons are, to a certain extent, it may be more or less, immune or resistant to a certain disease. For instance, a person who in infancy suffered from an attack of small-pox is generally immune to another attack of that disease. This would appear to be a condition of active immunity, whilst in other cases, by the introduction of the proper prophylactic serum, a certain passive condition of immunity may be set up, such as is illustrated above.

As this question of immunization is practically the basis of the

whole of serum-therapy, a short consideration of the various theories concerning immunity may not be out of place.

Firstly, there is the exhaustion or pabulum hypothesis. This theory, supported by Pasteur and Klebs, supposes that in the body are found a number of substances ready to form the food material of a particular species of bacteria, which on a first invasion consumes all this pabulum; and as a fresh supply is not afterwards produced, a second attack becomes impossible. In seeking for an explanation of second, third, and more attacks of these usually self-protective diseases, one can only suppose that the first (and subsequent, up to the last) attack of the bacterial army was not sufficient to eat up all the food material, or that a fresh supply of the special chemical substance forming this pabulum was re-formed in the tissues. There are analogies for this theory in Nature, such as the common experience of rotation of crops, whereby the farmer knows that to obtain the best possible crop of wheat it is better not to sow wheat on the same field year after year; while although the field may be in an exhausted state as regards wheat-producing material, yet for other crops, e.g., potatoes or roots, the field may be eminently suitable.

In order to admit the truth of this theory, we must presuppose that each specific organism requires a special food substance, which is present in the blood of all susceptible individuals at birth.

Against this theory, however, are the facts that certain bacteria may be cultivated out of the body in the very blood in which they would not grow inside the body; also that soluble substances, freed from all living germs, which certainly could not bring about such an exhaustion of food material, nevertheless were able to produce immunity.

Ritter has also discovered that the growth of the inoculated bacteria takes place within a very narrowly limited portion of the organism, whereas this hypothesis presupposes a general diffusion of micro-organisms throughout the body, and a complete exhaustion of available nutriment.

The second, or retention, hypothesis is in direct contradiction to the previous one. Its principal supporters are Chauveau, Behring, and Kitasato, the latter of whom found that the blood of an animal made immune against diphtheria and tetanus will destroy the poison formed by those specific microbes, and that this power is alone possessed by the blood serum of such an immune animal. It supposes that the excretions of the specific organism remain in the body, and, as it were, prevent the return of the same species. It is upon this hypothesis and the next one which we shall discuss,

namely, the theory of "acclimatization," that the antitoxin treatments now adopted are based.

Thirdly, the theory of acquired tolerance, or acclimatization. According to this hypothesis it is assumed that the cells of the body become used to the products of the organism, and that at last they cease to have any injurious influence upon them, and behave in the presence of the pathogenic organism as if in the presence of a harmless foreign body. A combination of these two theories seems able to explain all the observed phenomena respecting serum-therapy and immunity. The toxic products are prepared outside the human body, and are introduced as the protective serum, whereby the refractory condition appears to be induced without any cellular struggle.

Fourthly, the theory of phagocytosis. Metschnikoff appears to have been one of the first to notice that when small quantities of certain spores were introduced into the transparent bodies of a form of daphne, the amœboid leucocytes, collecting around them, took them into their substance, destroyed their power of germination, and finally disintegrated them. In the human body these powers appear to belong to the white elements in the blood, which he called phagocytes, and divided them into two kinds, according to the different reactions displayed towards various bacteria.

Thus, in erysipelas the *Streptococcus erysipelatis* gets into the lymphatics and multiplies there. It does so in spite of the presence of the phagocytes of the class of macrophagocytes, which generally show little power of attacking micrococci. Then ensues the inflammation, accompanied by a great invasion of leucocytes, which, as microphagocytes, eat up the micrococci. The latter have even been found inside the cells in various stages of degeneration; they are then converted into irregular granules and digested. The leucocytes are not only capable of devouring bacteria, but any animal debris may be digested by them. Hence they play an important part in the resolution of inflammation. Metschnikoff also held that if in the case of a local infection the first number of leucocytes that hurried to the spot were not sufficient to repel the invaders, more and more were brought forward, till at last they were so numerous that the organisms could not make any headway, and were thus destroyed. The attraction possessed by living or dead bacteria for the leucocytes is certainly remarkable, while they are equally repelled by the presence of certain bodies, such as quinine, chloroform, etc.

The foregoing are the principal hypotheses advanced. The truth probably lies not with any one alone: all four play their part,

one predominating over the others in different cases. They are each based on some amount of experimental evidence, and more than one may, in fact, play a part in the phenomena which they seek to explain.

But it cannot be said that any one of them alone has up to the present time been sufficiently verified. For the time being it can only be stated that acquired immunity is a capacity either to prevent the growth of disease organisms, of which the pathogenic action may lie in their intercellular tissue or their metabolic products, or to neutralize the toxic action of such products.

The immunity obtained is not nearly so absolute or permanent as in time past has been supposed, for we all know that well-vaccinated and even small-pox-marked persons are liable to an attack of small-pox, and frequently do contract mild forms of the disease. Then, again, in scarlet fever, which has been looked upon as the beau-ideal of a self-protecting disease, we find that about 4 per cent. of the cases occurring are in patients who have had attacks of the disease before, generally, of course, after a somewhat long interval of time, although recently I had under my care a male adult patient notified as suffering from scarlet fever. He passed through a definite illness of this character, taking just about six weeks for complete desquamation to occur, and was discharged from the hospital, only to return on the evening of the same day with a well-marked scarlet fever rash just appearing. He again went through all the stages of a further and secondary attack of scarlet fever.

Third and more attacks of scarlet fever in the same patients are rarer, only amounting to about 1 to 2 per cent. of the cases, although during the last year I had a patient under treatment who had had five attacks of scarlet fever, and as this number seemed somewhat unusual, I wrote to several of the medical men who I was informed had attended the patient at these times, and found such to be the case.

The immunity conferred by an attack of measles or syphilis is also considerable and of long duration; in typhoid fever it is fairly well marked; in diphtheria more transient; whilst in pneumonia, erysipelas, influenza, and cholera it is hardly at all apparent.

Artificial immunity may be produced by inoculation with an attenuated virus—i.e., with the living micro-organism artificially weakened. Vaccination is the classical example of this method. Numerous observers have succeeded in producing vaccinia in the cow or calf by inoculation with variolous matter, and from it

obtained successful human vaccination. Vaccinia therefore would appear to be variola attenuated by passage through the calf.

This "attenuation" of the virus may be produced either (1) by growing the bacilli at a high temperature, (2) by adding some chemical substance to the media upon which the virus is grown which weakens the virulence of the pathogenic germs, or (3) by passing the virus through certain animals, as in variola passed through the calf.

Another method of immunization is by injecting at first extremely small and gradually increasing doses of the virulent microbes, similar to Pasteur's method of anti-rabic protection.

A further method for conferring immunity is by the injection of two micro-organisms together, for it has been found that by injecting *Bacillus pyocyaneus* simultaneously with *Bacillus anthracis*, a condition of immunity against anthrax has been produced.

These methods all involve the use of living bacteria. There are other methods, however, in which non-living chemical substances are used, which substances are generally the products of bacterial action, are usually poisonous, and hence have been called "toxins." By the injection of minute but gradually increasing doses of these bacterial toxins, an animal may be rendered immune, and in some cases the immunity is both to subsequent injections of poisonous doses of the toxin, and also to the action of the living bacteria as well.

At the present time horses are immunized to diphtheria by subcutaneous injections of gradually increasing doses of the fluid of diphtheritic cultures, which have been kept some time in an abundant supply of oxygen, and from which the bacilli themselves have been separated by filtration.

Antidiphtheritic serum is produced on a large scale by the method indicated above. When the horse under treatment is thought to be sufficiently dosed with the diphtheritic poison so that its blood serum contains its maximum amount of antitoxin, the jugular vein is opened, and, with strict antiseptic precautions, a quantity of blood is withdrawn, from which the clot is abstracted, leaving the serum containing its medicinal properties. The horse appears to have been chosen chiefly on account of the large amount of blood which it will yield without causing the death of the animal, and also on account of its being so readily obtainable. Blood, or pure-bred, horses are found to yield the best results, and whilst undergoing the treatment the animals generally considerably improve in condition, as evidenced by their fine glossy coat, etc.

Having now a large quantity of serum at hand, it remains to

determine quantitatively its curative power, or, in other words, to find out how large a dose is needed to neutralize a definite amount of diphtheritic poison. The German method of standardization is now generally employed, and for this purpose a series of guinea-pigs of about 250 grammes weight are injected with ten times the smallest fatal dose of a filtered broth culture (fatal in forty-eight hours), mixed with varying quantities of the serum being tested. The smallest quantity of serum which will protect the animal from death is noted, and is considered to contain one-tenth of a unit of antitoxin. Thus, if .01 c.c. completely protected, the serum is said to contain 10 units per c.c.

The serum thus standardized is then put up in phials, containing amounts varying as required. The chief points to insure success in treating cases of diphtheria by means of this serum appear to be as follows: First and foremost, early use of the serum. This is one of the chief difficulties, as we are so prone to wait until there is almost overwhelming evidence of the presence of the disease before resorting to the remedy, and even then we sometimes defer the treatment in the hope that other means will avail. It would be well if in all cases of suspected diphtheria we could obtain bacteriological evidence, but even this requires time, and during that interval much valuable time in regard to the effective treatment of the disease has been lost. In my opinion it is preferable, in every case where diphtheria is reasonably suspected, to immediately use the antitoxic serum. The ill effects caused by this remedy in cases where the ailment has not later justified its early diagnosis as diphtheria have been found to be practically nil; the agent appears to act quite as a specific against the diphtheria bacillus, and, should none of these germs be present, simply establishes a condition of passive immunity against future attacks (limited as regards time), which action of the serum has already been discussed. Therefore, as there are no evil consequences to fear, inject early, and secondly, in sufficiently large doses. It appears, as the result of experience, much better to give one initial large dose, sufficiently large, if possible, to counteract the amount of poison already generated in the system by the dose of bacillus received, and thus to at once effectually check any further action, as if any bacilli are left unattacked by the first dose, they simply go on developing at the extremely rapid rate peculiar to them, producing their toxic compounds at the same time, so that it may be necessary to give as large a dose on the next day as was given on the first occasion, and even then a considerable army may be left untouched. Doses recommended are as much as two, three, four, and even more

thousand units at the first sight of the patient, for if we really believe that the serum confers immunity as well as cures the disease, we should surely have no objection to giving a larger dose, if possible, than is really necessary, as we should by so doing only help to produce a stronger condition of immunity.

The third point is that the hypodermic injection should be performed with all antiseptic precautions, for by so doing we are able to eliminate a large class of troubles which we might otherwise be liable to put down as due to the remedy used, whereas they were really caused by the means of using the remedy adopted.

The following figures abstracted from the reports of the medical officers of the Metropolitan Asylums Board, as showing the influence of early treatment with serum as regards mortality, appear noteworthy. In 1895 61.8 per cent. of cases of diphtheria received were treated with antitoxin, and in 1896 71.3 per cent.; those not treated including the moribund or hopeless cases, and very mild or doubtful cases.

Of these large numbers, the mortality amongst those treated with antitoxin on the first day of the disease was in 1895 11.7 per cent., and in 1896 4.7 per cent.; those treated on the second day, in 1895 12.5 per cent., and in 1896 12.8 per cent.; those treated on the third day, in 1895 22 per cent., 1896 17.7 per cent.; fourth day, 1895, 25.1 per cent., 1896 22.5 per cent.; fifth day and later, 1895 27.1 per cent., 1896 24.6 per cent., averaging for the whole number treated in 1895 22.5 per cent., 1896 20.8 per cent., and in 1898 20.4 per cent. of fatal cases.

The remarkable difference in mortality (in all children under ten years of age) from diphtheria in 1894, that is, without antitoxin, and in 1896, with antitoxin, in the same hospitals was shown in the *Lancet* of June 5th, 1897:

	Treatment commenced on First Day.	Fourth Day and afterwards.
1894 (without antitoxin)	25.2 % fatal	40.0 % fatalities.
1896 (with antitoxin)	5.6 "	28.8 "

Somewhat recently there has been some correspondence in the medical papers showing that the rate of fatalities from diphtheria was much greater in London than in Berlin and some other places, and it was also further brought out that, whilst the rate of mortality from diphtheria in the Metropolitan hospitals has been decreasing under the antitoxin treatment, as shown above, yet the mortality amongst cases not taken into those hospitals has not materially altered, and this even whilst the total percentage of cases removed to the hospitals has been increasing. This peculiar

condition of things appears to be explained by the fact that the treatment of diphtheria by means of antitoxin has not received the attention amongst general practitioners which its success fully warrants; in fact, Dr. Goodall states that this form of treatment appears to be, instead of the general rule, quite the exception.

The next specific serum to be considered will be the *antistreptococcic serum*. The action of this agent appears to be directed chiefly against the two closely allied bacilli, *i.e.*, *Streptococcus erysipellatis* and *Streptococcus pyogenes*, which bacilli are almost identical with, and indistinguishable from, each other, and when introduced into the cutis produce the condition known as erysipelas; when reaching the valves of the heart, endocarditis; when transplanted to the endometrium of parturient women, the virulent form of puerperal fever; and when found in serous cavities or the subcutaneous tissues are always associated with a condition of purulent change.

The horse has again been utilized as the living medium for the production of the protective serum in a manner similar to that described for diphtheria, and its antitoxic power has been tested similarly.

Several cases of the diseases above named have been treated with this agent, frequently with good results, which have been recorded in the various journals; still, this serum requires more extended use before one can speak so strongly for its adoption as for that of diphtheria. This treatment, however, should not interfere with older methods, but only be used in conjunction with them.

Antityphoid serum is not a true "antitoxin" in the sense described previously, for its action appears to be directed against the bacilli themselves more than against the toxic products of the same, although in some experiments a certain amount of this action has been noticed.

The results of this form of treatment are not yet sufficiently numerous to be able to form positively reliable opinions respecting its use, although many good results have been obtained and published.

The subject of the "serum diagnosis of typhoid fever," although closely related, is hardly germane to the title of "serum-therapy," and hence must be passed over.

Antitetanic serum is, again, very like antidiphtheritic serum, in that its action is directed against the toxic products of bacterial growth. Here, again, the necessity for immediate treatment is, if anything, more urgent than in cases of diphtheria, for the disease is purely a disease of the central nervous system, set up by the

poisonous action of the toxins of the *Bacillus tetani* upon the central nervous system, apparently producing a progressive derangement of cell mechanism and of functional activity; hence the first indication of the disease, *i.e.*, convulsive movement or difficulty in opening the mouth, is not evidence of the beginning of the poisoning, but simply shows that the process has been going on for some considerable time—in fact, so long as to have already disastrously affected the part of the nervous organization controlling the convulsed part, and therefore treatment only commenced at this stage will be somewhat late in the day. In view of the fact that the *Tetanus bacillus* acts from a purely local source, and that therefore the site of infection (which is frequently a punctured or contused wound) is the site of the toxin factory, as it might be termed, it shows how necessary is a thorough cleansing, and even excision, of such wounded tissue, and by this surgical means getting rid at the outset of the source of the disease.

Haffkine's *anticholeraic serum* has more recently occupied attention, and has been used during the recent epidemics in India and the East with considerable success; but full details have not yet been authoritatively published, although, from what is known already, I should judge that this serum will be one of the successful methods of treatment in the future.

Other sera, namely, antipneumococcic serum, antisiphilitic serum, and sera for the treatment of tuberculosis, leprosy, yellow fever, and snake venom have been brought to light, but some of these have proved disastrous failures for the purpose intended, but have proved extremely useful for other and quite as important—namely, diagnostic—purposes, notably tuberculin and mallein, whilst some others of these last named have not yet received sufficient support either to prove their virtues or otherwise.

Looking at the whole range of this class of bacterial diseases, and considering the success of the now classical means of variola prevention and the more recent discovery of the antidiphtheritic and other sera, there certainly appears to be presumptive evidence that in the future the reliable treatment for these ailments will be by means of the hypodermic syringe and the specific sera in question.

THE SANITARY INSPECTORS EXAMINATION BOARD.—The next examination for certificates of qualification for appointment of sanitary inspector or inspector of nuisances, under Section 108 (2) (d) of the Public Health (London) Act, 1891, will be held in London on Tuesday, May 1st, 1900, and the four following days. Particulars will be forwarded on application to the Hon. Secretary, Wm. R. E. Coles, 1, Adelaide Buildings, London Bridge, London, E.C.

SOME OBSERVATIONS ON THE PURIFICATION OF SEWAGE.*

By H. MEREDITH RICHARDS, M.D. (Med. and State Med.), London.
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THOUGH among medical officers of health, at any rate, there is now a consensus of opinion as to the general principles of sewage purification, the advance in our knowledge in recent years has been so great that there must still be room for divergence of opinion as to how theory and general principles are best translated into practice and working details. Much of this divergence is, no doubt, attributable to the fact that there is so much variation in the quality of sewage, and in the physiographical conditions obtaining at the outfall works. Much, however, is to be gained by the discussion of concrete examples, and with your permission, therefore, I propose describing as shortly as possible the past failures, the present successes, and the future plans, of the Chesterfield sewage works.

In addition to being an inland town, Chesterfield labours under the disadvantage of being situated on quite a small stream, and while the county town of Derby still solves the sewage question by the primitive method of sewers discharging direct into the Derwent, Chesterfield has for twenty years been compelled, by the exigencies of its position, to endeavour to avail itself of the best practicable means of dealing with its liquid refuse.

The present population of the borough is about 25,000 persons. There are no separate sewers for rain-water, and the town is mainly served by privy middens. The dry-weather flow of sewage is about 750,000 gallons per day. This includes slop-water from over 4,000 houses, the yield of about 800 water-closets, a very considerable share of manufacturing waste, together with a good deal of subsoil water. The manufacturing waste is derived from three large breweries, a large tannery, some bleaching works, and, recently, from steel tube works.

Prior to 1877 the sewage was untreated, and found its way at various points, directly or indirectly, into the canal. This gave rise to so much nuisance that the owners of the canal obtained an injunction compelling the Corporation to take some steps to remedy the evil. An eminent engineer was consulted, with the result

* Read before the Birmingham and Midland Branch of the Incorporated Society of Medical Officers of Health, January, 1900.

that a main intercepting sewer was constructed, and 37 acres of land acquired for a sewage farm. The land selected consists of admirable brick clay, which is so compact and homogeneous that in recent filtration experiments it has not been found necessary to build containing walls for the filters. Yet this land was under-drained in the apparent belief that downward filtration was practicable through such a medium. At the present day it seems almost incredible that even the most enthusiastic advocate of land treatment could ever have devised a scheme so eminently foredoomed to failure.

A farm bailiff, blessed with a double share of the prejudices of his class, was placed in charge of the works, with the usual result. Like the husbandman in Ecclesiasticus, he set "his heart upon turning his furrows, and his wakefulness to give his heifers their fodder."

Needless to say, the subtleties of sewage purification resolved themselves into the manufacture of by-passes and short-cuts by which the sewage could be unobtrusively turned into the river or into the underdrains with the least possible injury to growing crops. Nor could the bailiff be much blamed for this, for a few months' experience must soon have convinced him that even if the crops were sacrificed, the application of a large quantity of strong, crude sewage to a small area of clay land was a mere ritual. Though I have no record of early chemical examination of the land effluent, there can be no doubt that anything like complete purification was never obtained.

As time went on the town grew, trade effluents increased, and the sewage became less amenable to treatment. To add to the difficulty, the stream into which the land effluent passed practically disappeared, except in storm time, all the water having been abstracted by the canal company before it reached the farm. For many months in the year, therefore, the river Rother starts from the sewage farm, and the land effluent has no fresh water to dilute it or to supply it with oxygen. Complaints were made, and in 1894 the Corporation again engaged an expert engineer. Under his advice three precipitation tanks were constructed. These were rectangular in shape and on the continuous-flow principle, while arrangements were made for travelling squeegees to sweep the sludge to the proximal ends of the tanks, whence it was to be siphoned into a sludge-pit. From the sludge-pit the sludge was forced into sludge presses, and converted into cake. As first designed, the squeegees were not successful, but they have since been remodelled by the Chairman of the Sewage Works Committee, and are now

satisfactory. These tanks have been working since 1896, and have removed a fair proportion of suspended impurities, with the production of about 20 tons of sludge per week.

Into the relative value of the various precipitants experimented with I cannot now enter, but must content myself with saying that, taking it all round, lime—in the proportion of about 10 grains to the gallon—seemed the most satisfactory reagent.

Even after clarification, it was found that Chesterfield sewage was still very strong, containing on an average .62 part per 100,000 of albuminoid ammonia. Naturally,* 30 acres of clay land are incapable of purifying a dry-weather flow of 750,000 gallons of such a liquid.

Nearly three years ago the Corporation became convinced of this fact, and determined to seek some additional means of effecting the desired purification. The acquisition of more land was discussed, but abandoned, seeing that the subsoil for many miles down the valley is of the same nature as that of the present farm.

It seemed, therefore, that some process of bacteriological filtration offered the only chance of success, and I was instructed to experiment in this direction, and see how far filters would effectually purify Chesterfield sewage.

The first experiments were made with two small filters. One was made of coke breeze and the other of coal, as nearly as possible in accordance with Mr. Garfield's formula. Neither was absolutely successful, though the coal filter gave the best results; but after some fifteen months' experience, during which the filters were several times taken to pieces and reconstructed, we were able to satisfy ourselves that the production of a satisfactory effluent would require—

1. Primary and secondary filters.
2. Very uniform distribution on the surface of the fine filter. This was one of our chief difficulties. With distribution through troughs it was exceedingly hard to hit the happy mean between a pervious and impervious surface. When the surface was rendered pervious, all the sewage passed through a very small proportion of the total area of the filter, while when it was so impervious as to secure uniform distribution, aeration was checked, and the effluent became unsatisfactory. It is obvious that this uniformity of distribution would not be so essential in the case of a more dilute sewage.
3. Very careful attention to the preparation of the filtering media.

* Part of the farm is too high to be reached by the tank effluent.

There were also signs of the advisability of increasing the size of the material and of providing a fine or secondary filter.

Bearing these data in mind, we proceeded to construct two new filters, each about one-eighth of an acre in area, one to be a coarse and the other a fine filter. Their construction is as follows:

The coarse filter is composed of coke breeze, coarse cinders, and potters' rammel. No very definite size has been adhered to in selecting these materials, except that all that would pass through a three-eighths-inch mesh has been excluded. The depth averages 3 feet 6 inches.

The fine filter is composed of washed coal, generously presented to the Corporation by Mr. Alderman Pearson, Vice-Chairman of the Sewage Works Committee. It consists of a mixture in nearly equal parts of washed coal, which passes through a quarter-inch mesh and stays on a one-eighth-inch mesh, and coal which passes through a one-eighth-inch mesh and rests on a one-sixteenth-inch mesh. The depth averages 5 feet. From past experience we feared that this coal erred in the direction of fineness, but it was the only suitably prepared (carefully graded and washed) material available, and we therefore gladly availed ourselves of the Vice-Chairman's gift.

While considering the very difficult problem of distribution, the writer had the advantage of seeing the sprays used by Mr. Corbett (Surveyor to the Salford Corporation) on his small experimental filters. The advantages of such a system were obvious, and it was therefore determined to adopt a modification of the Salford plan. These spreaders consist of a horizontal network of iron pipes perforated at intervals on their upper surfaces. Sewage under pressure flowing through these pipes issues in jets through the perforations. These jets impinge on metal discs, and are broken up into a fine spray. The distribution is made more perfect in our case by the fact that the motive power used to propel the sewage through the distributing pipes is compressed air working a Shone's ejector. This has the advantage of intermitting the spray and causing the sewage to impinge with varying force against the discs. Doubtless also the intimate contact with the air so induced produces a fair amount of aeration. Be this as it may, there is no doubt that the surface distribution is extremely satisfactory. The use of the ejector, furthermore, enables us to absolutely control the amount of sewage applied in each moment of time.

I may add that both filters are under-drained by perforated earthenware pipes, no concrete floor or retaining walls have been found necessary, and the work has been done out of revenue by the ordinary staff of the farm.

Method of Working.—Only tank effluent is dealt with, and it was thought that the best results would be obtained by combining anaërobic and aërobic action. It was therefore arranged to work the coarse filter anaërobically. It is accordingly always kept full, the inlet valve being set so as to keep the surface as nearly as may be constantly flooded. Through this coarse filter the sewage finds its way into the underdrains, which deliver it into a small reservoir feeding the ejector. The ejector has a capacity of 100 gallons, and the inlet valve is fixed at such a point as experience shows will allow of its filling and discharging once a minute.

Albuminoid Ammonia—Parts per 100,000.

Date 1899.	Tank Effluent.	Anaërobic Filtrate.	Aërobic Filtrate.	Remarks.
June 9th ...	0.52	0.26	0.08	
" 14th ...	0.60	0.36	0.10	
" 15th ...	0.60	0.36	0.08	
" 29th ...	1.00	0.48	0.10	
" 30th ...	0.52	0.36	0.06	
July 11th ...	0.20	0.18	0.08	Nitrate, 0.8.
" 19th ...	...	...	0.08	Nitrate, 1.20; land effluent, 0.26.
" 26th ...	...	...	0.04	
Aug. 3rd ...	0.52	0.32	0.08	
" 10th ...	0.64	0.44	0.10	
" 12th ...	...	...	0.06	
" 17th ...	0.44	0.32	0.08	
" 24th ...	0.68	0.48	0.08	
" 29th ...				
" 31st ...	0.60	0.28	0.10	
Sept. 15th ...	0.60	0.42	0.12	
Oct. 31st ...	0.80	0.28	0.08	
Nov. 2nd ...	...	...	0.08	
Dec. 8th ...	1.63	0.80	0.18	This bad result was due to an undue share of trade refuse accidentally reaching the experimental works.
" 12th ...	1.20	0.48	0.06	Hard frost.
" 14th ...	1.00	0.28	0.08	Hard frost.
Totals ...	11.55	6.10	1.72	
Average ...	0.72	0.38	0.086	

Results.—Work was commenced on June 6th, and has been continued until December 29th, except on Saturday afternoons and Sundays and during alterations to the plant.

The ejector discharges on an average once per minute. For the first month the filter was worked eight hours a day; but this has been increased to ten hours, which is the maximum rate which it has hitherto been found possible to work at.

Attempts to deal with more than 100 gallons per minute proved that if this were done the effluent deteriorated, and the filter tended to become water-logged, owing, doubtless, to the material of which it is composed being rather too fine.

The working day has never exceeded ten hours, as we cannot at present work the ejector at night. It will, however, be possible to make different arrangements in the immediate future, and it is hoped by dividing the day into three or four cycles of work and rest to get a longer period of daily activity.

Chemically, the amount of purification is shown by the results of analyses made between June 9th and December 14th, 1899, set out in the Table on the opposite page.

When I add that the final filtrate is clear and sparkling, it will be seen that we have every reason to be satisfied with our first six months' work. It is true that the quantity per acre is comparatively small, but our first object being to prove the feasibility of filtration, we have been specially anxious that the filter should never be overtaxed, and have every confidence that its working day can be considerably increased as soon as convenient arrangements can be made for doing so. Moreover, very large allowances must be made for the strength of the sewage as compared with that of other towns, and for the fact that the final effluent attains a higher standard of purity.

Albuminoid Ammonia per 100,000.

	Tank Effluent.	Final Filtrate.
Chesterfield, June to December, 1899 ...	0.720	0.086
Dibdin, April, 1894, to September, 1895 ...	0.555	0.151
Manchester (open septic tank and double filter), July to September, 1899 ...	0.314	0.065
Exeter (Pearmain and Moor) ...	0.671	0.157

Owing to other duties, I have not had an opportunity of examining the specimens produced to-day, but Dr. Barwise has kindly forwarded me his results from duplicate samples. They are as follows:

	Albuminoid Ammonia per 100,000.
Raw sewage ...	2.00
Tank effluent ...	0.80
Anaërobic filter ...	0.56
Aërobic filter ...	0.10
	1.25 nitrates.

I wish next to refer briefly to the sludge problem. In 1894, as already stated, it was decided to have recourse to sludge presses. In the earlier stages of our experiments (1897), various suggestions

were made as to the biological treatment of crude sewage on either aerobic or anaerobic lines. It seemed, however, that no process had stood the test of experience for such a length of time as would warrant our adding to our labours by dealing with this side of the sewage problem. During the last three years, however, various developments have taken place. The cost of sludge-pressing and the difficulty in disposing of the resulting cake have made us anxious to adopt a more scientific process, and the proved success of biological methods as applied to tank effluent convinced us that we were working on sound lines. More especially we have been influenced by what we saw being done with Manchester sewage, when a deputation from Chesterfield had the advantage of an interview and discussion with Mr. Fowler, the superintendent chemist at the Davyhulme works.

Since February, 1899, raw Manchester sewage amounting to 1,700,000 gallons per twenty-four hours, without the addition of any chemical, has been allowed to run through one of their precipitation tanks. The rate is such that the tank would be filled in about twenty-four hours. "Under these circumstances the contents of the tank soon became black, and bubbles of gas began to rise, often accompanied by masses of sludge from the bottom, which on still days formed a scum, which gradually completely covered the surface of the liquid. Up to the present the only notable quantity of sludge which can be perceived, on dipping with a rod, is immediately beneath the inlet penstocks; indeed, our experiments seem to show that an enormous quantity of the sludge, which would otherwise accumulate, is destroyed in this way. A series of analyses of the effluent show it to be practically identical in quality with that obtained from the closed septic tank of the installation of Messrs. Cameron, Commin and Martin."

From July 12th to September 13th, 1899, the average amount of albuminoid ammonia in this "open septic tank" effluent was 0.314 per 100,000, a figure which is practically identical with the effluent from those tanks in which the sewage is treated by chemicals.

This result was so satisfactory that we determined to investigate the applicability of the system to Chesterfield, and since August 26th one of our precipitation tanks has been worked on these lines. We succeeded after a delay of about twelve weeks in getting a uniform scum to cover the whole surface, but this has since almost completely disappeared and reappeared on several occasions with striking rapidity.

* Expert's report, October 30th, 1899.

Owing to an accident, I can at present only give three comparative analyses, viz :

				Open Septic Tank.	Lime Tank.
September 15th	...	...	...	0.60	0.64
November 1st and 2nd	...	...	...	0.80	0.60
December 14th	...	...	...	1.00	1.00

These numbers are obviously too small to average, but they are decidedly encouraging, especially when I add that there is no appreciable amount of sludge in the septic tank, and that the effluent is of such a character that it can be dealt with by our filters.

Just a word as to future plans. We are now erecting a destructor on the sewage farm. This will supply motive power for any mechanical apparatus required, and a sufficiency of hard clinker for the construction of filters. Ground is now being excavated for two more pairs of filters. The first new pair will be on similar lines to the present pair, and fitted with a similar spraying apparatus, but the material for the fine filter will be carefully prepared destructor clinker and potters' rammel of such a size as will pass a $\frac{1}{8}$ -inch mesh and rest on a $\frac{1}{2}$ -inch mesh. The second pair of new filters will be on the lines of those in use at Davyhulme, but actuated by Adams' controlled siphons. It has been thought wise to make this particular experiment, as our earlier attempts to treat sewage on the "holding-up" principle were perhaps prematurely abandoned. By that time we shall be able to accurately ascertain the maximum capacity of our filters, and proceed with the construction of a series of filters sufficient to deal not only with all our dry-weather flow, but with a large proportion of storm water. For the latter we propose converting part of the old river-bed into the latter we propose converting part of the old river-bed into "held-up" filters. Meanwhile, there is one serious difficulty in view, viz., what to do with the clay which is displaced by the filtering material. So far we have found a convenient tip, but this will soon be exhausted. Two suggestions have been made :

1. To raise the fine filters above the present surface of the soil, and lift the sewage from the rough filters.
2. To make arrangements for turning the clay into bricks, and so recoup ourselves for the labour entailed in getting out the ground.

These, however, are problems of local rather than general interest.

In conclusion, I may say that there are two or three points on which I should like an expression of opinion. Is it well, with a sewage like ours, to attempt to reduce the large amount of subsoil

water which we know finds its way into the sewers? What has been the experience of other members of the society with the biological treatment of sludge? What filtration schemes have been found most applicable to such institutions as fever hospitals? I ask this last question because I have recently had to get out schemes for three small hospitals.

Lastly, I have to thank the members of my committee for the assistance they have always rendered me, and Dr. Barwise, not only for constant assistance and advice, but for his great kindness in placing his laboratory at my disposal.

DISCUSSION.

The PRESIDENT, on opening the discussion, spoke at some length on his own personal experiences in connection with the drainage of the Worcester City Hospital, and further in working the bacterial method of filtration.

Professor BOSTOCK HILL expressed the very great interest which he felt in the facts and details brought forward by Dr. Richards. The time had now arrived when land for the treatment of sewage was superseded by other and more scientific methods of sewage disposal. He had himself to deal with some experiments made in connection with a very offensive town sewage where experimental works upon an exceptionally large scale were being carried out. He thought that the presence of infiltration water in the sewers was not wholly disadvantageous, but as the quantity varied so widely, it became a disturbing factor in making calculations. He saw little or no difficulty in the biological treatment of sludge, as in some hitherto unpublished experiments of Mr. Garfield's none had occurred. In those experiments typical Wolverhampton sewage sludge had been so far reduced as to become a liquid capable of passing through a filter, but he was sceptical about the financial aspect of the process. With regard to silt, theoretically of course it was organic; but in practice it was not always so, and effects took place even at moderate temperatures; it was usually necessary to cover silt tanks. In his opinion, it was not very material for an average sewage whether the method employed was aerobic or anaerobic, but sewages of exceptional character (for instance, that of Yeovil and the like) were only to be treated anaerobically. He considered the constitution of Exeter sewage quite exceptional. The essentials were a contact bed followed by subsequent beds of finer material, for which he considered coal the best. Latterly, however, the cost of the coal employed, which had been next to nothing, had become nearly ten shillings a ton, and this was a serious item.

Dr. REID (Staffordshire) elicited from the reader of the paper that the strength of his tank effluent was 0.6 of alb. ammon.; that his flow was 100 gallons per yard super. per diem, and that all passed through the tank. With regard to the relative merits of coal and coke, Dr. Reid had found at Burslem that coke and ashes broke down earlier than did coal, although even coal failed eventually. In the Massachusetts experiments the ash filters soon crumbled. He did not think the Chesterfield results were really good in face of the figures given. For the contact filter he found the broken saggars of the Potteries did well. He inclined to believe that, prejudice apart, the septic tank was no better than other methods.

Mr. HENRY MAY congratulated the reader of the paper on having worked his experiments out of revenue without the interference of the Local Government Board. The absurd and obsolete requirements of the Board with regard to land were ridiculous, and at the present time no less than 7½d. per pound was being paid for the methods of land treatment by Birmingham.

Dr. RICHARDS briefly replied.

"ON THE VENTILATION AND LIGHTING OF BYRES."*

By A. K. CHALMERS, M.D.

Medical Officer of Health of Glasgow.

IN asking your attention to the Dairies Order of 1899 I have chiefly in view two purposes, both of which are somewhat outside the terms of the Order itself. Although the Order simply aims at the exclusion from human food and, with reservation, from the food of animals of milk obtained from a tuberculous udder, we shall not, I believe, have rightly interpreted the spirit in which the Order is framed, or for that matter rightly apprehended public opinion on the question, if we await the advent of the udder disease and thereafter rest satisfied with expelling the animal. On this point I think there will be general agreement, as there will be also with the further proposition that the necessity for excluding an animal can only arise from the neglect of earlier precautions which might have protected the animal from the udder affection. In this sense, indeed, the necessity for putting into force the Amending Order of 1899 may be regarded as the opprobrium of dairy regulation, so that our aim will be not so much the exclusion of animals with udder affection as the creation of conditions which will render the occurrence of this affection unlikely. This leads directly to the first intention of this note, which is to invite some discussion on two of the items which may be regulated by Section 13 of the Order of 1885, viz., the lighting and ventilation of byres. Without attempting to disparage the importance of the other requirements, as to cleansing, drainage, and water-supply, the regulations I have selected bear most directly on the subject of the new Order. They are, moreover, so variously interpreted in different parts of the country, that one is in danger of losing sight of the principle on which structural arrangements should be moulded. Lighting (?) most of us I think will have seen expressed by an occasional roof light to which may be added now and again the light from an open doorway, and ventilation, we know, is not infrequently mimicked by a few tile-pipes inserted into the walls, usually stuffed with straw, and not rarely communicating with an outside lean-to erection used indiscriminately for young or yeld animals when not given up to its original purpose of a cart-shed. Between these provisions and what one pictures as

* Notes of a paper to introduce a discussion before the Scottish Branch of the Incorporated Society of Medical Officers of Health, November, 1899.

efficient lighting and ventilation there is a gap which no physical science can bridge, and yet these are the varying structural extremes which help to promote or prevent the advent of that condition in the stalled animal which has made the Order of 1899 necessary.

Beyond this there are administrative questions which I also think may not unfittingly be discussed here in connection with the present Order. Broadly speaking, milk is produced in the country and consumed in the towns, although this manner of stating it puts the equation in a more simple form than it exists. Few towns or villages—none of any size, I imagine—produce all the milk they consume, whereas, on the other hand, no rural district is likely to be dependent on an adjoining town for its milk supply. Milk production in more perfectly organized communities may or ought to be wholly relegated to the country, unless our cities are to be reconstructed on a different model; but for the present it is not so, and we must deal with the existing conditions. There thus exists what in other industries is expressed by the term 'foreign competition,' but with the disadvantages nearly all on one side. For this I doubt if it were possible—it certainly would be unproductive—to attempt to allocate the blame. The town producer has a market at his door, and the cost of production is lessened by at least the cost of transit; but the town consumer is more susceptible to suggestions of the risk attaching to objectionable conditions of production, and as a rule insists on a higher standard of accommodation for the animal which is to supply him and his children with milk. From this it follows that the production of milk in towns has usually been placed under restrictions as to structural conditions unknown in many milk-producing districts in the country, although, were the difficulty solely one of the conditions of production, it might well be left to the usual forces which adjust commercial differences. But the consumer has a right to be heard; and if the towns insist on conditions of local milk production which will place it beyond any reasonable risk of contamination, he has armed himself with the right to demand power to prohibit the sale of milk produced elsewhere under conditions which are not the fair equivalent of his own standard. I am far from advocating the municipal control of rural dairies. This I believe would be fatal as a policy and unworkable as a practice. But I venture to think that the time has come when urban and rural authorities may take counsel together because mutual advantage seems to me to lie that way. The towns require the milk, and the dairy farmer requires a market for his produce, and there remains but to adjust the conditions on which the exchange can be carried on.

There is one word of criticism which I will permit myself, because it has some bearing on what I have afterwards to say in connection with the subject of ventilation. The first Royal Commission made, I humbly think, an unguarded statement when they recommended the consumer to protect himself against the risk of tubercle by boiling his milk. It is no doubt true that protection may thus be obtained; but the recommendation should have been accompanied by the collateral statement, which is equally important, that milk loses, and loses greatly, according to some observers, its nutritive value by being so dealt with. And the second Royal Commission lends some countenance to the view that, provided the cow has certain facilities for open-air life during part of the year, its respiratory needs during the period in which it is housed are lessened. In opposition to this I am disposed to remind you of the history of phthisis in the Royal Navy. Seamen above all others spend their working hours in circumstances the least likely to promote lung diseases, and yet before the sleeping accommodation provided for men in the Royal Navy was reformed as a result of the inquiry of the special Commission some years ago, the prevalence of phthisis among them was very great.

Now, it would seem as if we were about to undertake a similar experiment with the cow. Such criticism, however, may be pushed too far; for after all it is not chiefly the cubic space which immediately surrounds the cow, but the frequency with which the air thereof is changed, and the means provided for accomplishing this, which at the moment concern us. Moreover, if engineering science applied itself to this question of the air supply of byres, and came forward with proposals for heating and mechanically ventilating them, I do not see how we could logically insist on a greater space per cow than is necessary for working the animal in, provided the proposals contained provision for supplying it with from 12,000 to 18,000 cubic feet of air per hour. But it is here that the difficulty begins, although it is simplified if we keep in view chiefly what is requisite for healthy animal life.

As a preliminary requirement for the supply of fresh air within a byre, free movement of air around its walls externally should be possible, and the circular letter of the Local Government Board accompanying the Order of 1899 makes a well-timed suggestion regarding outside structures. It is but an extension of this principle to add that the erection of back-to-back byres should be prohibited, and that no byre should be permitted in what we are in towns accustomed to call a "hollow square," that is, an area of ground contained within a continuous wall of tenement buildings.

A freely circulating atmosphere all round being assured, how and where is it to be introduced to replace the vitiated internal air of the byre? Here a most perplexing diversity of opinion and custom meets one, and it is curious that while opinion seems to circle round an opening in the wall some 6 or 7 feet above the floor level, practice usually puts an occasional opening just under the eaves.

Both positions cannot be equally serviceable, and it is permissible to ask whether either situation will attain the object of supplying the cow—and not the upper part of the byre only—with the air required. It is obvious that the fresh air must be brought within the comparatively limited area through which the animal can move its head, and unless the air here is being continuously renewed the ventilation must be regarded as defective. The prevailing custom of stalling cows against the walls of a byre in what is practically a *cul de sac* increases the tendency towards stagnation of the air at the very place where the respiratory impurity is being produced. This consideration has given rise to the occasional introduction of a definite inlet at the head of the stall about 2 feet above the ground-level, an experiment which has the recommendation of being based on a definite principle.

Another device giving effect to the same principle is to have an opening in the wall opposite each trevass, and slightly narrower than it, so as to break the force of strong wind, and this is a method which seems capable of a useful development by repeating the openings in a vertical direction to the full height of the trevass. Both of these methods supply the air directly to the breathing area, and the question of their control in stormy weather can, I think, only be worked out from experience. I am assuming that no system of artificially heating the air is introduced, but it is wholly a matter of experience whether this would be necessary were a feeding passage at the head of the stall introduced. From another point of view the introduction of this passage would be an advantage, for with it the *cul de sac* form of stall would disappear. Of equal importance with the situation of the inlets is their size, which should be definitely related to the amount of air required by each animal. Assuming mechanical means are not employed, we must fall back on an assumption of constancy in two factors which are variable, viz., differences in temperature and wind pressure. With a difference of about 20° in the former, and a vertical distance between the inlet and outlet of something like 18 or 20 feet, 12,000 cubic feet of air per hour requires an inlet roughly of 100 square inches, the difference in height above indicated covering a variation of several inches in the size of the opening. This for

inlets alone with a corresponding similar provision in the ridge for outlets.

Lighting.—Light is more equally distributed when the windows are in the roof, but their value as a means of perflation is less than when placed in the side walls. Probably an equal distribution in both side walls and roof would have advantages provided a definite relationship is maintained between the superficial area of lighting and the contained cubic space. One foot of window space to every 150 cubic feet seems a reasonable provision.

ZINC AS A NORMAL CONSTITUENT OF DRINKING-WATER.—Carl Thomas Morner (*Upsala Läkarefören*, 1898, iii., through *Hygienische Rundschau*) examined the water of a well in the country near Upsala, which, in spite of a peculiar taste, had been in daily use for a year. Analysis showed traces of iron and no less than 8 milligrammes of zinc to the litre present as a carbonate. No disturbance whatever of the health of any of the persons who had been using the water constantly during the year had occurred.

[This case adds to the evidence against the cumulative action of zinc. Two wells which yield water containing notable amounts of zinc are known to have been in constant use, one of them as the sole public well of a small German town, for more than a century, without, as far as known, causing any disturbance of health. There are several springs in the southern part of Missouri which contain very much larger amounts of zinc than any of the above-mentioned.—C. H.]—*American Journal of Medical Science*.

THE URINE IN ENTERIC FEVER.—The results obtained by a number of observers in the examination of the urine in typhoid fever for bacilli are tabulated by Gwyn as follows: 1. In quite a high percentage, perhaps from 20 per cent. to 30 per cent. of all cases of typhoid fever, typhoid bacilli may be present in the urine. 2. When present they are usually in pure culture, often so numerous as to make the freshly voided urine turbid, and may then be detected by a coverslip examination. 3. Appearing generally in the second and third week of illness, the organisms may persist for months or years, probably multiplying in the bladder, the urine being apparently a suitable medium for their growth. 4. Though often showing evidences of cystitis and marked renal involvement, the urine containing bacilli has usually only the characteristics of an ordinary febrile urine; the presence of bacilli has no prognostic importance, and their disappearance or persistence without having induced local change is the rule. 5. Lastly, as shown by Richardson, irrigation of the bladder with mercuric chloride, and the internal administration of urotropin, a compound of ammonia and formaldehyde, seem to be safe methods of removing the bacilli; 30 or 60 grains of the latter quickly removing all bacilli in six cases. Until the appearance of a marked Widal reaction in one case the urinary condition gave the only reliable indication of the nature of the illness, and the author suggests that in cases where the Widal reaction is delayed a bacteriological examination of the urine should be instituted. The infected urine can be readily rendered sterile in a half-hour by the addition of an equal volume of 1.40 carbolic acid solution.—*Bulletin of Johns Hopkins Hospital*, through *Philadelphia Medical Journal*.

SEPARATE DWELLINGS.*

DR. R. DUDFIELD desired to place before the meeting a case which had been submitted to counsel on the subject some two years ago. The difficulties he (Dr. Dudfield) had experienced were worded by him for submission to the solicitor as follows:

1. What interpretation is to be placed on the phrase "originally built or adapted by additions or alterations and used for the sole purpose of providing separate dwellings"?

2. How far do the words in question govern the interpretation to be placed on the whole subsection?

3. Is the medical officer of health to examine any house "on request by the person who would be liable to pay the house-duty," or is he entitled to decline to do so, until he has evidence that the house which he is asked to examine is one "originally built or adapted by additions or alterations and used for the sole purpose of providing separate dwellings"?

4. In the event of the latter contingency, would the surveyor of taxes of the district be the proper person to whom application should be made for evidence that the house is one to which the subsection would apply, conditionally on the certificate being given by the medical officer of health?

As was only to be expected, his questions were somewhat modified by the solicitor in drawing up the case which was submitted to counsel in the following form:

1. "Whether the medical officer of health is obliged to examine any house 'on request by the person who would be liable to pay the house-duty,' etc., under the 26th section, subsection 2, of the Customs and Inland Revenue Act, 1890, or is the medical officer of health entitled to decline to make such examination until he has evidence that the house which he is asked to examine is one 'originally built or adapted by alterations or additions and used for the sole purpose of providing separate dwellings'?"

2. "If counsel be of opinion that the medical officer of health is entitled to demand such evidence before examination of any house, whether the surveyor of taxes would be the proper person to certify that the house is one to which the section would apply?"

3. "Whether in a case coming within Rule vi. or xiv. of the schedule to 49 George IV., c. 55, the person on whose request the medical officer of health is to examine a house would be the owner of the house in question or the occupier of each 'separate dwelling,' and if the latter, whether he can be called upon to give a certificate in respect of part of a house only?"

The opinion of counsel was as follows:

1. "Section 26 (2) of the Customs and Inland Revenue Act, 1890, only imposes upon the commissioners the obligation to discharge the assessments therein referred to upon production to them of the medical officer's certificate. In order to enable the person who would otherwise be liable to pay the assessment to produce such certificate, the medical officer is required upon his request to examine the premises assessed for the purpose of giving the necessary certificate. The medical officer

* Adjourned discussion on the paper by Dr. Sykes. (See PUBLIC HEALTH, xii., p. 309, February, 1900.)

is, in my opinion, entitled to require the person making the request for the examination of his premises to produce some evidence showing that he is assessed in respect of premises to which the subsection applies, such as notice of the assessment and his rent-book or demand for rates. The medical officer of health is not, however, entitled to require any particular kind of evidence. Should he refuse upon request to examine premises to which the subsection really applies, and the person making the request be thereby prevented from obtaining the benefit of the subsection and proceed against him in an action for damages, the question would be whether or not he had acted reasonably in disregarding the request, having regard to the evidence produced by the person making the request.

2. "There is no obligation of the surveyor of taxes to certify that a house is one to which subsection 2 applies, and the medical officer of health could not safely disregard other evidence indicating that the house was one to which the subsection applied, and insist upon a certificate from the surveyor of taxes.

3. "Under subsection 2 of section 26 of the Customs and Inland Revenue Act, 1890, the person who is to make the request is the person who would be liable to pay the house-duty if such duty were not discharged by the commissioners. Under Rule vi. of the Schedule B of 48 Geo. IV., c. 55, the liability to pay the duty is only imposed upon the occupier in the first instance; it is the owner who has to pay the duty ultimately. I am therefore of opinion that in the case of premises to which the rule applies the occupier is not the person who would be liable to pay the duty within the meaning of subsection 2 of the later Act. Under Rule xiv. of the Act of George IV., however, the occupier is the person who is to pay the duty; he would therefore be entitled to make the request under subsection 2 of the Act of 1890; and the medical officer of health would therefore be called upon in case of such request to certify as to part of a house only."

Dr. Dudfield, continuing, said the question as to what constituted "separate construction" was entirely ruled out in submitting the case to counsel, but, having regard to the decision of the Appeal Court, that was immaterial. There was another important point, viz., that no right of entry was given, and if an occupier refused an entrance they could not get in at all. He thought that medical officers of health ought to agree on a minimum standard which could be generally adopted.

Dr. DIXON (President) observed that Dr. Dudfield's remarks were very interesting and useful, but did not exactly deal with the subject of Dr. Sykes' paper, which was rather whether in giving their certificates they had any right to consider the construction of the building as separate dwellings or merely their construction so as to be adapted for separate families. In his opinion they had only to do with the construction of the buildings for separate families, irrespective of their being separate dwellings. It was not even a matter of sanitary condition; if the houses were constructed so as to be adapted for separate families, they were bound to certify.

Dr. FIELD referred to some newly-constructed, self-contained flats which had no accommodation for ashbins outside the dwellings. The only access to the common yard was through the flats on the ground-floor, or through a tunnel from the street to the yard. The ashbin in the flats above the ground-floor had to be kept in the scullery. Gas-cooking apparatus was fitted to each flat, and a large quantity of vegetable matter would no doubt accumulate during the summer months. He

thought such a house could not be certified, but the owner provided small balconies, accessible from the scullery windows, where the ashbin could be kept outside the flat. When that was done he certified the premises. As a matter of fact, one balcony in twenty was occupied by the ashbin, the others being used for flowerpots and such things; but as far as the construction went, they were there, and he accordingly felt justified in certifying. He was quite in a muddle as to the question of separation. There were in his district houses very similar to those described in *Seaman v. Lee*, in connection with which the surveyor of taxes first wrote him that such houses did not come under the Act, but in a subsequent communication he said that the Inland Revenue Commissioners had taken the opinion of their legal advisers and were informed that separation was not necessary. The surveyor advised him (Dr. Field) to inspect, which he did, and gave the certificate. He moved that the question be referred to a committee with a view to drawing up a minimum standard of requirements, and to ascertaining the practice of medical officers of health at present.

Dr. DAVIES seconded the proposition.

Dr. SYKES, in replying, desired to submit certain points supplementary to his paper. In *Seaman v. Lee* the dwellings were not severed, but were separately used, and the common staircase was enclosed. If the medical officer of health objected to give a premium to the owner of such a house, he became liable to an action for damages. In most cases the tax-assessors assessed such dwellings separately, and only a very few house-owners needed to apply to medical officers of health for certificates. All that was left for medical officers of health to decide was the cases where there was no actual severance, where the people had to go on to a common landing to get from one room to another. He was aware of many houses with enclosed staircases which were split up into separate ratings. On the definition of a "house" the opinion of Mr. Cunningham Glen (taken by the Vestry of Westminster) was instructive. Mr. Glen said:

"It seems to me that the Legislature in using the terms 'house' throughout the Small Dwellings Acquisition Act, 1899, have properly used a word which is capable of wide significance, and have carefully refrained from placing any limitation upon the meaning of such word by means of a definition. A 'house,' then, to which the Act applies is, I think, any place of abode the fee simple of which can be acquired, or in which a leasehold interest can be acquired for a term of not less than sixty years, provided, of course, that the express provisions of the Act as to residence, sanitary condition, etc., are complied with. It follows, in my opinion, that the word 'house' in the Act of 1899 can be taken to include a 'tenement' or 'flat,' or a dwelling approached by a staircase used in common by other tenants of the building comprising such tenement, flat, or dwelling."

In reference to the definition of a lodging-house the following important case must be quoted: *Roots v. Beaumont*, Queen's Bench Division, April 6th, 1886: Public Health Act, 1875, section 90, Bye-laws as to Houses let in Lodgings.—A local board made bye-laws requiring registration, etc., from the landlord of a lodging-house, and defined "lodging-house" to mean "a house or part of a house which is let in lodgings or occupied by members of more than one family." B. let four unfurnished rooms of her house to M. and his family. *Held*, the justices were wrong in holding that B. did not come within the meaning of the definition as landlord of a lodging-house (51 *J.P.*, p. 197).

As emphasized in the paper, in compound houses the most clear line of demarcation was that of the severance of each dwelling from the rest of the building. If an essential part of a dwelling, such as the passage between a bedroom and living-room or kitchen, be in common use by all the occupants of a building, as in a made-down house, then the dwelling may be a separate dwelling, but it is not a severed dwelling, and still less a self-complete and less still a self-contained dwelling. The test of a severed dwelling was that access from one room to another was obtained without leaving the privacy of the dwelling. He would ask, Do the leading cases justify merely severed dwellings, which were neither self-complete nor self-contained, being assessed as separate houses? The methods of assessment of dwelling-houses were at the bottom of the whole question.

FORMALDEHYDE AS A MILK PRESERVATIVE.—A. G. Young (*Proceedings of American Health Association*, November, 1899; *Medical Record*, November 11, 1899) makes the following conclusions in regard to the action of formaldehyde as a preservative of milk: (1) That used as a preservative it tends at least to impair the nutritive value of milk; (2) Its tendency is to interfere with the digestive processes. In either case it is only a question of dosage, and the limit of safety is difficult to determine; (3) That though the inhalation of formaldehyde gas is much less dangerous than the breathing of the other gaseous agents much used as disinfectants, the results of tests upon animals, and of one case of accidental poisoning of a human being, indicate that formaldehyde taken into the digestive system may produce dangerous and even fatal results; (4) It would be unwise and unsafe to encourage or to suffer the use of formaldehyde in the public milk-supply, even under any possible restrictive regulations; (5) In every State, as is now the case in many, there should be a law prohibiting with effective penalties the use in milk of any chemical preservative whatsoever.—*American Journal of Medical Science*.

EVIDENCE OF SEWAGE POLLUTION.—Some experiments have been made by the Chicago Health Department on the presence of Klein's *B. enteritidis sporogenes* in water as evidence of sewage pollution. Klein and Clowes found this organism to be always present in sewage, and suggest, therefore, that its presence in drinking-water may become one of the most delicate and valuable evidences of the sewage pollution of potable water. Dr. Gehrmann, of the Chicago Health Department, examined forty-two specimens of sewage, 130 of city drinking-water, sixteen of milk, eight of garden earth, and one of cheese. Bacteria of the species described by Klein were found in all specimens of sewage. With the drinking-water the results were practically negative, even during a recent pollution in which the *B. coli communis* was abundantly demonstrated. The method, therefore, does not seem to be of great value for the examination of drinking-water. The *B. enteritidis sporogenes* was not found in the milk.—*Bulletin of the Chicago Health Department*, July, 1899.

[The writer believes that the *B. enteritidis sporogenes* is a widely-distributed organism, and is not unfrequently present in the normal intestine. As regards the presence of this organism in milk, the writer's experience agrees with that of Klein, viz., that it can be demonstrated in a large proportion of samples.]

BILLS BEFORE PARLIAMENT.

SESSION 1900.

I.

ALTHOUGH there appears to be only a very remote probability of any of the Bills dealing with sanitary reforms becoming law, we think it desirable to give some account of the proposals therein contained. The order in which they occur in these notes is not that of merit but of convenience.

Housing of the Working Classes Bill.—This Bill is backed by Messrs. Steadman and Burns and others, and is splendidly Radical, not to say Socialistic, in its aims.

For the purposes of Part III. of the Housing of the Working Classes Act, 1890 (briefly "the 1890 Act"), it is proposed that land shall be acquired compulsorily by a local authority after six months' notice to the owner at a price representing twenty-five years' purchase "based on the annual value assessed for taxation." If the owner be not known, a notice served on the lessee is to suffice. Land to be so acquired need not be within the area of the local authority acquiring it; but if the authority, within whose area such land lies, objects to the proposed acquisition, an inquiry is to be held by the Local Government Board, but the Board is to have "no power to refuse to sanction the acquisition of such land if it can be shown that land in the area of the acquiring local authority is insufficient in quantity or too dear for workmen's cottages to be erected thereon." (As the taxation value is based on the assessment of the local authority, this would put an acquisitive authority in a dilemma. Should the land be assessed low with a view to compulsory purchase at a low value? or should it be assessed high for the benefit of the rates?) Loans for the purposes of the Bill are to be obtainable from the Public Works Loan Commissioners at 2 per cent. for terms of one hundred years, and payments to the sinking fund are to be made out of current rates.

In the case of an unhealthy area, dealt with either under Part I. or Part II. of the 1890 Act, the owner is to be compelled to clear the site at his own expense, and the local authority is to have the right to purchase the cleared site at twenty-five years' purchase of the ground-rent "prevailing prior to the clearance." (This would afford a capital opportunity of obtaining freehold sites in a rising neighbourhood. There is no provision to earmark sites so purchased for "housing" purposes.)

"For the purposes of this Act (Bill), and the 1890 Act, and for any other legitimate purpose,"* local authorities are to have the power to impose a special rate on owners of all sites, vacant or built upon. The ordinary rates are to be levied on all properties, whether occupied or unoccupied.

Any surplus arising from any "authorized undertaking" is to be applied to "housing" schemes and (apparently) for establishing municipal works for carrying out such schemes. "Fair rent" courts are to be established, consisting of three members. One member is to be appointed by the trades unionists of the district, or by householders rated at £20 or less per annum; a second by the local chamber of commerce or the local bench of justices; and the third by the two former members, or, if they fail to agree, by the Board of Trade. Members are to be elected for three years. The court is to meet "as often as may be required to hear cases of grievance of tenants" as to their rents. (Happily, there is no remuneration provided for, and the enormous amount of work which would come before the members would soon put an end to all ambition to be on the court.) In estimating a fair (?) rent, a profit not exceeding 3 per cent. is to be allowed on the original outlay, after allowing for repairs and management. No higher rent is to be demanded, nor is the complaining tenant to be evicted from his house for five years after the finding of the court. (No mention is made of default in payment of rent, consequently such tenant could live in the house rent-free for five years!) Should a landlord venture to do anything contrary to the finding of the court, such landlord is to be punished for "contempt of court." (By whom, and how?)

In all housing schemes and in all common lodgings, each adult is to have 600 cubic feet of space, after making due allowance for furniture, two children under eight to count as one adult. (The arrival of an additional blessing, or the purchase of a family wardrobe, would involve a removal of a family who took an apartment duly calculated to the "strength" of the household when moving in.)

The Bill is to come into effect on January 1st, 1901. We think there is a mistake here. The drafters must have meant *February 30th*. The Bill is an admirable example of what may be expected when those who have nothing to lose gain the power to legislate for their own class at the expense of those who are blessed with worldly possessions.

* The italics are ours.—Ed. PUBLIC HEALTH.

Housing of the Working Classes Act (1890) Amendment Bill.—This, the Government Bill, is as modest as the preceding Bill is preposterous. Indeed, it may be described as disappointing in its poverty of ideas. It contains only two working clauses, one to enable a local authority to establish lodging-houses for the working classes outside its own area, and the other to allow rural authorities, subject to certain restrictions, to adopt Part III. of the Act of 1890. The latter proposal is not likely to be of any real utility unless a further provision be made giving additional facilities for loans covering periods of sixty years or more. Something should also be done to simplify and shorten the procedure laid down by the Act of 1890. The appointment of a new Commission on the subject of the Housing of the Working Classes has been proposed, and we question the advisability of tinkering at existing legislation. Codification and remodelling are urgently required.

MILK STANDARDS.—That the standard now adopted by the Somerset House analysts errs towards leniency is manifest from the following results of analyses, reported by Dr. Harris, Medical Officer of Health of Islington :

	Number taken.	Genuine.	Adulterated.	Percentage Adulterated.
Samples taken on Sundays ...	49	46	3	6.1
Samples taken on week-days ...	49	44	5	10.2
Samples taken at Finsbury Park Station ...	30	30	0	0.0
	128	120	8	16.2

	Number of Samples.	Solids-not-fat.	Fat.	Total solids
Milks procured in transit at Finsbury Park Station ...	30	8.85	3.91	12.76
Milks taken on Sundays ...	49	8.69	3.72	12.41
Milks taken on week-days ...	49	8.61	3.57	12.18
Somerset House Standard ...		8.50	3.00	11.50

An examination of these figures shows that the milk as it arrives at Finsbury Park Station is of good quality, but that before it reaches the public it has been reduced with water, and deprived of its fat. They also prove that even the altered standard of Somerset House is not so high as the average of any of the milks bought in Islington on Sundays or on week-days, even though in the one case 6.1 per cent. had been adulterated, and in the other 10.2 per cent.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

A MEETING of the Society was held at No. 197, High Holborn, London, on Friday, March 9th, 1900. Present: Dr. A. Newsholme (President), in the Chair, Drs. J. Kelland, W. A. Bond, Shirley F. Murphy, Oliver Field, W. H. Symons, E. F. Willoughby, J. Priestley, L. T. F. Bryett, G. Millson, J. Scott Tew, G. E. Yarrow, R. Dudfield, J. F. J. Sykes, Sidney Davies, J. Tubb Thomas, J. W. Hembrough, J. E. Beggs, W. H. Hamer, W. J. Simpson, G. T. Cattell, D. L. Thomas, A. K. Chalmers, H. Beale Collins, and F. J. Allan, and Mr. W. Defries, Members of the Incorporated Society, and Drs. T. G. Roe, T. Glover Lyon, E. Maslin, Messrs. Thomas Blashill, W. Wightman, J.P., Owen Fleming, and Falkiner, Visitors.

MINUTES.—The minutes of the last ordinary meeting were read, and having been approved, were signed by the President.

The HON. SECRETARY read letters regretting inability to attend from Bailie W. Brown (Chairman of the Housing Committee, Edinburgh Corporation), and Mr. J. Crouch (Peabody Trustees).

ELECTIONS.—The following candidates having been duly nominated, a ballot was taken, and they were declared by the President to be unanimously elected, viz.:

AS A FELLOW.

Hoare, E. Stanley, L.R.C.P., M.R.C.S., D.P.H., Mansfield, Notts, Assistant M.O.H. Mansfield.

AS ORDINARY MEMBERS.

Felkin, Henry George, M.R.C.S., L.R.C.P., D.P.H., Chest Hospital, Brompton.

Kirton, Martin Ainger, L.R.C.P., M.R.C.S., D.P.H., 2, Outram Terrace, Devonport.

NOMINATIONS.—A number of candidates were then nominated for election at the next meeting.

A DRAUGHTLESS VENTILATOR.—Dr. THOMAS GLOVER LYON exhibited a model and gave a demonstration of the working of the "Lyon Cadett System of Draughtless Ventilation."*

At the close of the demonstration a unanimous vote of thanks was accorded to Dr. Lyon for the interesting demonstration.

Dr. J. PRIESTLEY then read a paper on "Present-Day Area-Condensation under the Housing of the Working Classes Act, 1890."†

At the close of the paper a discussion ensued, in which the President, Mr. Thomas Blashill, Mr. Owen Fleming, Mr. W. Wightman, J.P., Mr. Shirley F. Murphy, Drs. F. J. Allan, J. F. J. Sykes, Hembrough, H. Beale Collins, and W. A. Bond took part.

On the motion of the PRESIDENT, a unanimous vote of thanks was accorded to Dr. Priestley for his paper.

North-Western Branch.—The ordinary monthly meeting of this Branch was held on Friday, March 9th, at Hale, Cheshire.

* An account of the system will appear in our next issue.

† Will be published in our next issue.

The following Members and Associates were present: Drs. Hayward (President), Garstang, Gornall, Graham, Drew Harris, Marsh, Porter, Scholefield, Sergeant, Smith, Wheatley, Wilkinson, Meredith Young, and Mr. Bishop. There were also numerous visitors, amongst whom were Drs. Hamill, Hutton, Duggan, and Surridge, Sir Bosdin Leech, Mr. Fowler, and numerous representatives of the Bucklow R.D.C. and of the Alderley Edge, Knutsford, and Middlewich Urban District Councils.

The minutes of the last meeting were confirmed.

Dr. Poole, M.O.H. Tottington, was nominated as a member of the Branch.

Dr. GARSTANG read a paper on "Practical Results of Experiments in Sewage Treatment."*

An interesting discussion ensued.

Before the meeting the members and visitors were conducted over the Hale Sewage Works by Dr. Garstang, who explained the various processes.

Metropolitan Branch.—A meeting of this Branch was held at No. 197, High Holborn, W.C., on Friday, February 16th, 1900. Present: Dr. Dixon (President) in the Chair, and Drs. R. Dudfield, F. J. Allan, J. F. J. Sykes, L. T. F. Bryett, W. A. Bond, Oliver Field, D. S. Davies, and A. Newsholme.

MINUTES.—The minutes of the last meeting of the Branch were read, approved, and signed by the President.

LONDON GOVERNMENT ACT, 1899.—Dr. R. DUDFIELD adverted to the Bill which he had heard was to be introduced into Parliament during the present session to confirm the alterations of boundaries made by the Commissioners under the London Government Act, 1899, and moved that a memorial be presented to the Local Government Board praying that provision should be inserted in such Bill to make all registration districts coterminous with the boundaries of the respective boroughs.

The motion was seconded by Dr. BRYETT, and on being put to the meeting was carried unanimously.

The adjourned discussion on Dr. Sykes' paper on "Separate Dwellings"† was then resumed.

A motion to refer the matter to a committee was, by permission of the meeting, withdrawn.

DANGEROUS INFECTIOUS DISEASE.—Pursuant to notice given, Dr. J. F. J. SYKES moved

"That a memorial be sent to the Local Government Board, praying that the word 'dangerous' in Section 60 (i.) of the Public Health (London) Act, 1891, be repealed."

After discussion, and a consideration of the motion adopted by the Branch on this subject in connection with the proposed amendments to the Public Health (London) Act, 1891, the motion was by leave withdrawn.

PSEUDO-DIPHTHERIA.—Dr. DAVIES called attention to cases of suspected diphtheria, specimens from which, submitted to the Jenner

* Will appear in our next issue.

† Vide PUBLIC HEALTH, February, 1900, p. 309.

‡ See p. 534 of this issue.

Institute, had been reported marked "pseudo-diphtheria bacillus found." He asked the opinion of the Branch as to whether such cases ought to be notified.

Dr. BOND had had similar results sent to him, and had always accepted the notifications of such.

Dr. ALLAN said there were two views amongst bacteriologists on the subject, some taking one side and saying it was diphtheria, and some the opposite.

Dr. FIELD had had such cases reported, and when asked by the medical practitioner whether he should notify them, he had advised their notification, but not removal to hospital.

Dr. NEWSHOLME said the absence of the bacillus was not necessarily evidence that the case was not diphtheria. Some cases had to be decided on clinical grounds.

Scottish Branch.—A meeting of the Branch was held at Buchanan Street, Glasgow, on Saturday, February 17th, 1900. Present: Dr. Campbell Munro (Vice-President) in the Chair, and Drs. Nasmyth, Leslie Mackenzie, McDonald, Connell, McVail, Chalmers, Wilson, Steven, and Templeman.

MINUTES.—The minutes of the last meeting, held at Perth on November 25th, 1899, were read and approved.

Apologies were intimated from Professor Matthew Hay, and Drs. McNeill, Douglas, and Robertson.

CENSUS 1901.—The SECRETARY read the memorial regarding the Census of 1901,* which had been drawn up by the Council, and submitted to the Local Government Board of Scotland. It was remitted to the Council with powers to take whatever steps they deemed necessary to have their suggestions carried into effect.

The Secretary was instructed to issue a circular to members of the Branch inviting suggestions as to the proper definition of the terms "house" and "family" for the guidance of enumerators in the forthcoming Census.

RESIGNATION.—A letter was submitted from Dr. Sutherland resigning his membership of the Branch and of the Council, as he had left Scotland and intended to connect himself with one of the English branches of the Society. Dr. Wilson was appointed member of Council in his room till next annual meeting.

Dr. LESLIE MACKENZIE read the second part of his paper on "Methods of Disinfection,"† dealing chiefly with hypochlorite of lime, perchloride of mercury, and formic aldehyde. Discussion on this paper was postponed till after its publication in the Journal of the Society.

A discussion took place on the paper submitted by Dr. CHALMERS at the last meeting in Perth on "Dairy Construction."

Southern Branch.—A meeting of the Southern Branch was held at Portsmouth on Friday, February 16th, 1900, at 2.30. There were present: Dr. Kelly (President) in the Chair, and Drs. Fraser, Stott, Bostock and Groves, and Dr. Willoughby (Hon. Secretary).

MINUTES.—The minutes of the previous meeting were read and confirmed.

Dr. Griffith—Medical Officer of Health of Hove—was elected a member of the Branch.

* See p. 548 of this issue.

* Will be published in a future issue.

PASTEURIZATION OF MILK IN BULK.

THERE is no need for us to attempt to demonstrate the necessity of endeavouring to secure a milk supply which shall be free from such dangerous organisms as those of tubercle, enteric fever, etc. When this cannot be obtained by the proper control of all stages of production, the simplest method is to boil all milk, but such milk would not become popular for some time to come. Alternatively pasteurization is recommended, but, in this country at least, has not hitherto been attempted on a commercial scale. The following account of the precautions adopted by the Bath and Somerset Dairy Company, published in the *Times* of February 12th, has something more than a passing interest, and is deserving of record in these pages. We could wish that the example here set before the milk-trade were likely to be generally followed.

The milk to be treated is obtained from a number of farms within a radius of seven or eight miles of Bath, whence it is conveyed by cart to the company's premises in that city. On arrival the milk is poured into a large receiver, into which it passes through a fine-meshed wire strainer intended to arrest mechanical impurities. From the receiver the milk is raised by a small rotary pump through tubes to a tank overhead. It falls thence by gravitation down a tube, which causes the milk to find its way through a closely-clamped cottonwool filter, where further purification is effected. It immediately passes onwards to a vertical turbine pasteurizer, which is steam-jacketed, and inside which the temperature of the milk is suddenly raised to 150°. To prevent the milk from depositing a crust upon the hot inner surface of this vessel the whole of the liquid is kept in violent agitation by means of vertical rods which are set in rapid rotation by the turbine. The maintenance of the milk at a temperature of 150° for the period of twenty minutes is effected by means of two covered receiving-tanks, each holding fifty gallons, and each occupying ten minutes in filling, the second not commencing to fill from the first till that is already full. The passage of the milk through these receivers thus occupies the desired twenty minutes, the necessary temperature being preserved throughout. Each receiving-tank is separated internally into six concentric zones, three of which are occupied by milk and the alternating three by steam. The attendant has at his command a steam valve and a cold-water valve, and, by keeping his eye on the thermometers inserted in the pasteurizer and the receivers, he has no difficulty in maintaining the temperature at the required level. The apparatus having once been started at 150°, there is, indeed, very little tendency for the temperature to vary. Immediately the second receiving tank is full the milk begins to flow automatically therefrom over a metallic cooler, and will continue to do so as long as the milk, however many hundreds of gallons there may be, is supplied to

the original receiving-vessel to be pumped up. The cooler, which is cylindrical, is about 4 feet in diameter and 6 feet high. The cooling milk affords a beautiful sight as it flows in a thin, continuous film down the traversely-sinuous sides of the cooler, the temperature of the inner face of which is kept low by a constant flow of cold water. During its passage over the outside of the cooler the temperature of the milk is suddenly reduced from 150° to about 50°, the temperature of the water. The milk accumulates in a circular channel at the base of the cooler, and a thermometer dipping in this channel shows if the temperature has been reduced to the desired level. From the channel the milk is drawn off by a two-way tap into scores of churns, one after the other, these churns or milk-cans being scrupulously cleaned every time before use. The milk in these large cans—as clean, pure, and faultless as modern science and engineering skill can make it—is now ready for retail delivery, and it is supplied daily to 3,000 houses in Bath. If a glass of milk be taken from the first receiver into which it is poured as it arrives from the farms, and a glass also from the milk as it flows from the cooler, there will be found no perceptible difference in the flavour of the two, and the most delicate palate will fail to detect any trace of cooked or scalded flavour in the pasteurized milk when the process has been properly carried through. But from a hygienic point of view there is a vast difference, for the high-temperature tanks play the part of a lethal chamber so far as disease-producing germs are concerned—the germs not only of tuberculosis, but of typhoid (*sic*), diphtheria, measles, and scarlet fever, all of which have at one time or another been proved capable of transmitting infection to the human subject through the medium of cow's milk. At present the Bath plant is used twice a day, and many thousands of gallons of pasteurized milk issue from it in the course of a week. The plant is thoroughly cleansed after each operation. Cold water is first run through every part of the apparatus in the same way as the milk. Water is next heated up to any desired temperature in the pasteurizer and run through the plant, and this is followed by a similar current of lime-water, which flows from a tank overhead and effectively completes the cleaning. Finally, cold water is once more run through, and the plant is again ready for a supply of raw milk from the country. The cleaning is practically automatic, as it involves little or no hand labour, and every part of the plant is readily accessible. The essential features of the process to which the milk is subjected are seen to be thorough filtration, effective pasteurization, and rapid cooling. The scheme was devised by Mr. H. Bailis Tucker.

EPSOM MEDICAL BENEVOLENT COLLEGE. — Gerald Percy Adams, younger son of the late F. E. Adams, M.D., formerly Vice-President of the North-Western Branch of the Incorporated Society and Medical Officer of Health of East Herts, is a candidate for election to this school in May next. His elder brother just missed election in 1896, and G. P. Adams is at present at the head of those carrying over for next election with 1,721 votes. The Editor would earnestly appeal to such of his readers as have votes for proxies on behalf of this lad.

CENSUS OF 1901: SCOTLAND.

REPRESENTATION TO THE LOCAL GOVERNMENT BOARD BY THE SOCIETY OF MEDICAL OFFICERS OF HEALTH FOR SCOTLAND.

THE Society of Medical Officers of Health for Scotland begs respectfully to make the following recommendations to the Local Government Board regarding the forthcoming census.

In no decade of the century has there been a more general development of sanitary administration in Scotland than in the decade now closing. This has been partly due to a more rapidly growing recognition of the advantages of sanitation by the people and their local governing bodies, and partly to the operation of the Local Government Act of 1889, which created a new sanitary organization for the counties, and of the Burgh Police Act of 1892, which greatly extended the sanitary powers of burghal authorities. In the early part of the decade, or immediately preceding it, there were also important sanitary enactments relating to the housing of the working classes, to factories and workshops, and to the notification of infectious disease, and in its later part there was the new Public Health Act of 1897. Under these and other public health statutes, sanitary administration and work have greatly developed, and now occupy a prominent place in local government, both in urban and rural districts. The sanitary department of our principal towns is now one of the largest connected with municipal administration, requiring the services of a numerous staff of officers and inspectors, and involving a heavy annual expenditure. But the expenditure on the staff is the least part of the expenditure for public health purposes. To say nothing of the very large sums spent at the instance of the Sanitary Department by individual owners, in bringing their properties into keeping with statutory requirements, many hundreds of thousands of pounds have been recently expended, and will continue to be expended, by local authorities, in carrying out schemes of water-supply and drainage, and in the erection and maintenance of fever hospitals and the like. Where so much labour and money are being expended, it is essential that the local authorities and their officers should be in a position so far as may be possible to ascertain the extent of the influence of such works on the improvement of the public health, with a view to their future guidance. Such information is of equal service to the central governing bodies, to the Local Government Board, and to Parliament itself, with whom the ultimate responsibility rests of controlling sanitary administration or of framing fresh public health measures. This information is chiefly obtainable from a careful inquiry into the vital statistics of the populations concerned; and the Local Government Board has for several years recognised the importance of such an inquiry by requiring all medical officers to prepare an annual report of the vital statistics of the districts under their charge. For this inquiry and report the indispensable foundation is a correct and sufficiently detailed census of the population concerned. Without this it is impossible for a medical officer to gauge properly the health conditions of his district and to prepare a report which would be satisfactory to himself or to the Local Government Board. The Society wishes especially to emphasize the necessity of the forthcoming census providing the desired information for each unit of sanitary administration, or, in other words, for the area of each local authority, as defined in the Public Health Act. It is of opinion that up to a certain point as

much detail should be given for small as for large sanitary areas, so as to give an adequate basis for inquiry, and to admit of a sufficient comparison of the vital statistics of one area with those of another.

The Society cordially acknowledges the great care and thought and ability exhibited in the arrangement of the details of past census reports, and appreciates the difficulty which may be felt by those responsible for the form of such reports in departing in any great degree from preceding arrangements. It is also, of course, aware that the interests of sanitary administration are not the only interests to be considered in the preparation of the census reports, and that other divisions have to be recognised besides those of sanitary areas; but the Society believes that there is now no public purpose for which the census is so necessary as for sanitary administration, and that no class of persons make so large and frequent use of the census returns as the officers engaged in public health work.

The Society is hopeful that less hesitation may be experienced in making such additions and alterations as may be necessary in order to comply with the pressing needs of sanitary administration when it is remembered that the next census will be the first in a new century, and the first, as already mentioned, after the passing of the new Public Health Act.

In laying this representation before the Local Government Board, the Society ventures to believe that its request for a census suited to the wants of public health officers can scarcely fail to meet with the Board's approval, and the Board must be already well acquainted with the difficulties under which health officers are at present labouring in preparing sufficiently accurate and detailed reports of the vital statistics of their several districts. The Society hopes that the Board will see its way to use its great influence and authority in securing that the views and wishes of the Society are duly considered, and, if possible, given effect to by those charged with the arrangements of the next census.

It may be of use to add that the information for each sanitary area should, in the opinion of the Society, embrace the following:

1. Number of males and females in quinquennial periods of age.
2. Number of separate families.
3. Number of houses (inhabited, uninhabited, building).
4. Number of houses of different sizes (windowed rooms), with, if convenient, number of persons occupying them.
5. Occupation of persons. This information is valuable for sanitary purposes; but the Society feels that, owing to the great detail in the classification of occupation hitherto followed in the census, the information could not be expected to be given for the smaller areas, unless possibly the classification were confined to the seven orders of "professional," "domestic," "commercial," "agricultural," "fishing," "industrial," and "no occupation," without any detail for each order.

It is desirable that the definition of "family" and "house" for census purposes should be revised so as to accord as closely as possible with the common signification. Whatever definition may be adopted for "house" and "family," it is hoped that they will be given *in extenso* in the census report.

In concluding this representation, the Society desire to say that they have had recently under consideration the question of a quinquennial census, and that a resolution in favour of such a census was unanimously and cordially passed. So far as public health purposes are to be served, the Society would be satisfied if every alternate quinquennial census gave little more than the gross population of each sanitary area.

ROYAL STATISTICAL SOCIETY.

THE CENSUS OF GREAT BRITAIN (BILL 93 OF 1900).

THE sub-committee appointed by the Royal Statistical Society to consider matters relating to the Census of 1901 submit the following observations upon the Bill on that subject introduced into the House of Commons on February 19th.

They note, in the first place, with much pleasure, the improvement in simplicity and general arrangement of the provisions, with special reference to the greater elasticity afforded by the delegation of most of the detail to the Registrars-General, instead of its incorporation in the statute. They cordially welcome, also, the introduction of Clause 9, whereby the use of the Census results in greater detail than is required for national purposes is materially facilitated. The transfer, again, of the assurance of the confidential nature of the inquiry, from the schedule to the statute, Clause 11 (3), appears a commendable precaution. Judged from an exclusively statistical standpoint, irrespective of any other considerations, the return of language seems, from the results of the last Census, to be on a different plane in Wales to that which it occupies in Scotland and Ireland, nor does it seem likely that the general accuracy of the return will be materially enhanced by the exclusion of infants. This, however, is not a point on which the Society has dwelt in former representations; and, in respect to the recommendations on subjects of greater importance which have been made during the past year, the Society has reason to gratefully acknowledge the extent to which the suggestions it has from time to time supported have been recognised in the Bill.

The sub-committee made, in all, nine suggestions. Of these, one has not yet been brought before Parliament; another has been adopted in part only, six have found recognition, and one only has been ignored. The results are briefly as follows:

- I. Uniformity has been secured in two of the three kingdoms.
- II. In Clause 1 the date recommended by the Society has been adopted.
- III. In Clause 4 (1) (a) the nationality of those born abroad is to be recorded.
- IV. In Clause 4 (3 and 4) the "tenement" is substituted for the "story."
- V. In Clause 5 (1) the prescription that schedules are to be copied into books has been omitted, and in Clause 10 (1) (c) the matter is left to the Registrars-General.
- VI. In Clause 5 (2) the record of houses occupied, though not inhabited by night, is insured. And
- VII. The early introduction of the Bill this Session allows, probably, fair, though not abundant, time for preparations.

But whilst the efforts of the Society have so far met with gratifying success, it must be acknowledged that it has been felt a grievous disappointment to all statisticians interested in the movement of the population and the progress of public health to note that the Bill contains no provision for an intermediate Census of the simple character recommended by not only the Statistical Society, but by a very considerable weight of opinion in the medical, actuarial, and municipal

worlds. Experience has proved on several occasions of late that whatever the degree of accuracy obtainable in forecasting the population at a given date when counted in millions, no method of approximation is applicable for practical purposes to smaller aggregates, such as those of cities and counties, after the lapse of four or five years from a general Census. It follows, too, that where a considerable variation in population is due to other than natural increase, the age-distribution of the community in question is also apt to diverge from that recorded at the preceding enumeration. With these considerations in view, not only new populations, like some of the British Colonies, but the older countries of the Continent of Europe, even including France, where the population is almost stationary, have deemed it worth while to adopt five years as the interval between their enumerations. The Statistical Society, however, has not recommended that the enumeration should be on each occasion in the full detail of a decennial Census, which is the plan adopted abroad, but has always held that the population by sex and age will suffice at the intermediate period. The project, though supported by the Departmental Committee of 1890, was shipwrecked on the rock of expense, but this consideration carries less weight if it be held that the intermediate Census is a necessary supplement to that of the decennial period, and that without it the latter loses a great part of its value after a few years. The simpler enumeration, it is estimated, would cost less than half as much as a general Census, and for £50,000 or so would maintain the continuity of observation to an extent to which all those interested attach the highest value.

The sub-committee accordingly express the hope that they may rely upon the co-operation of their colleagues, and also upon that of medical, sanitary, actuarial, and economic bodies in bringing home the importance of this question to Members of Parliament in order to get, if possible, the interpolation in the Bill of some such provisions as the following:

1. In the title, line one, the addition of "s" to "year," and in the margin the words "and 1906."
2. In the next line, after "one," add "and one thousand nine hundred and six."
3. Add to Clause 1 the words "also in the year one thousand nine hundred and six, on a date to be fixed hereafter by the Local Government Board."
4. In Clause 4 (i) add after sub-section (d) the following sub-section: "(e) At the census of one thousand nine hundred and six, particulars of name, sex, and age, and none other shall be required to be entered."

March 8th, 1900.

DISEASED MEAT PROSECUTION.—On January 25th last George Hancorn, farmer, of Elstree, Herts, was summoned before Sir Horatio Davies at the Guildhall, London, for sending four quarters, head, skirt, etc., of a diseased cow to the Central Meat Market, and fined £100 or two months. On a petition being addressed by the defendant to the Home Secretary, the fine has been reduced to £25—apparently on an *ad misericordiam* plea. We can only say that we regret the decision of the Home Secretary, as it is already sufficiently difficult to secure adequate penalties in these cases.

CASES OF INFECTIOUS DISEASE NOTIFIED IN THE SEVERAL SANITARY DISTRICTS OF THE METROPOLIS,

IN THE YEAR 1899, STATED AS PER 1,000 OF POPULATION.*

Name of District.	Small-pox.	Scarlet Fever.	Diphtheria.	Euteric Fever.	Typhus Fever.	Other Continued Fevers.	Puerperal Fever.	Erysipelas.	Cholera.	Totals.
West Districts.										
Paddington ...	...	2.97	1.58	0.76	0.00	0.00	0.05	1.14	...	6.5
Kensington ...	...	2.56	1.48	0.61	0.00	0.09	0.06	1.21	...	6.0
Hammersmith ...	...	4.05	1.76	1.06	0.00	...	0.11	1.05	...	7.9
Fulham ...	0.00	6.50	4.00	0.82	...	0.00	0.08	1.54	0.03	12.9
Chelsea ...	...	2.91	2.46	0.60	...	0.04	0.08	0.85	0.00	7.0
St. George, Hanover Sq. ...	...	2.44	1.12	0.56	...	...	0.02	0.91	...	5.0
Westminster ...	...	3.81	1.91	0.86	...	0.01	...	1.07	...	7.7
St. James, Westminster ...	...	2.24	1.69	1.55	...	...	...	1.00	...	6.5
North Districts.										
St. Marylebone ...	0.01	2.85	1.39	0.84	...	0.00	0.04	1.42	...	6.5
Hampstead ...	...	3.60	1.44	0.56	...	...	0.06	0.64	...	6.3
St. Pancras ...	...	3.52	2.30	0.98	...	...	0.05	1.25	0.00	8.1
Islington ...	0.00	4.31	2.04	1.03	...	0.00	0.09	1.02	0.00	8.5
Stoke Newington ...	...	5.17	0.85	0.48	...	...	0.19	0.99	...	7.7
Hackney ...	0.00	4.44	3.19	1.20	...	0.02	0.09	1.35	...	10.3
Central Districts.										
St. Giles, Bloomsbury ...	...	2.04	0.80	0.64	...	...	0.02	1.47	...	5.0
St. Martin-in-the-Fields ...	...	2.55	1.40	0.57	...	...	0.08	0.73	...	5.4
Strand ...	...	2.29	1.54	0.50	...	...	...	0.70	...	5.0
Holborn ...	0.03	3.92	2.11	1.07	...	0.06	0.03	1.37	...	8.6
Clerkenwell ...	...	4.87	3.03	1.37	...	0.01	0.09	1.07	...	10.4
St. Luke, Middlesex ...	...	3.96	2.52	0.88	...	...	...	1.58	...	8.9
City of London ...	...	2.64	2.03	3.42	...	0.03	...	0.75	...	8.9
East Districts.										
Shoreditch ...	0.00	3.00	3.09	1.39	...	0.01	0.08	1.66	0.00	9.2
Bethnal Green ...	...	3.34	2.67	1.57	...	...	0.14	2.52	0.00	10.2
Whitechapel ...	0.02	2.57	2.48	1.70	0.04	...	0.06	1.53	...	8.4
St. George-in-the-East ...	0.02	2.04	2.12	1.48	...	...	0.10	1.60	...	8.3
Lincolnhouse ...	0.03	2.90	2.24	2.29	...	...	0.05	1.32	...	8.8
Mill End ...	...	2.61	3.30	1.22	...	0.01	0.06	1.31	...	8.5
Poplar ...	0.01	2.46	2.48	1.62	...	0.02	0.08	1.34	...	8.0
South Districts.										
St. Saviour, Southwark ...	...	3.76	5.04	0.45	...	...	0.12	1.40	...	10.7
St. George, Southwark ...	0.01	3.93	7.40	0.92	0.01	0.01	0.03	1.25	...	13.6
Newington ...	...	4.10	5.87	0.88	...	...	0.04	1.62	...	12.5
St. Olave, Southwark ...	...	5.76	2.88	1.00	...	...	0.09	0.27	...	10.0
Bermondsey ...	...	4.68	6.32	1.18	0.08	0.01	0.03	1.03	...	12.2
Rotherhithe ...	...	6.24	3.90	1.31	0.02	...	0.04	2.04	...	13.5
Lambeth ...	0.00	3.29	3.64	0.72	0.00	0.03	0.09	1.09	0.00	8.8
Battersea ...	...	4.13	3.47	0.92	...	...	0.08	1.18	...	9.8
Wandsworth ...	...	4.34	2.94	0.64	...	0.00	0.06	1.13	...	9.1
Camberwell ...	0.01	4.32	4.69	0.66	0.00	0.01	0.07	0.97	...	10.8
Greenwich ...	0.00	6.62	3.75	0.91	...	0.01	0.07	1.49	0.00	12.8
Lewisham ...	0.01	6.87	5.28	0.63	...	0.01	0.07	0.92	...	13.3
Woolwich ...	0.02	4.02	3.15	0.65	...	...	0.12	0.35	...	8.6
Plumstead ...	...	10.99	2.84	0.39	...	0.01	0.06	1.01	...	15.3
Lee ...	...	4.85	3.35	0.52	...	...	0.05	0.72	...	9.5
The Metropolis†	0.00	3.98	3.02	0.98	0.00	0.01	0.07	1.23	0.00	9.8

* From the Annual Report for 1899 of Dr. F. J. Allan, Medical Officer of Health of Strand District.
† Includes 39 cases notified to the Port of London Sanitary Authority.

ON THE HOUSING OF THE WORKING-CLASSES IN LIVERPOOL.*

By E. W. HOPE, M.D.,

Medical Officer of Health of Liverpool.

Dr. HOPE's paper was freely illustrated with plans, elevations, sections, etc., of sites which have been cleared or amended, and of buildings erected in Liverpool. The reader observed that the problem of the housing of these classes, including the skilled artisans, the unskilled labourers, and the "submerged tenth," was one which the sanitary authorities of every large town in Europe and America had to face at the present time. It was rendered the more difficult by the fact that a large proportion of these classes—e.g., dock labourers, market porters, and others, must live near their work, and that the greater part of the houses occupied by them had been erected before any building regulations came into existence, were massed together without open spaces or sanitary conveniences, and were falling into decay. The substitution of sanitary dwellings fulfilling present-day requirements, with open spaces, baths, and washhouses, etc., at rentals such as the classes in question could afford, was no easy matter. It was worse than useless to attempt to provide decent accommodation for the idle, drunken, and criminal classes; their dispersal was best for themselves and for the community. Few places could show such satisfactory results from the improvement of the dwellings of the poor as could Liverpool, to which City was due the honour of having been the first to initiate legislation in this direction. During the last fifteen years nearly 4,500 "court-houses" had been demolished, their sites having been covered by buildings such as he was about to describe. But there still remained over 8,000, more than three-fourths of which were in the courts, the rest facing the streets, but back to back with the former. The width of the courts was on an average 8 feet, and that of the approaches from the street 2 to 3 feet. A court contained eight to ten houses of three rooms, one above the other, each reached by stairs or ladder from the one below. All houses were back to back and side to side, without any sanitary conveniences whatever. Water-closets, used in common, were placed at one end of the court, and dustbins at the other. The water supply was from a hydrant in the middle. It was in such areas that fevers were endemic, that epidemics of cholera and typhus prevailed, and that, notwithstanding the palliative efforts of the authorities, such as scavenging twice daily, unlimited water supply, prompt removal of the sick, and prevention of overcrowding, the (crude) death-rate ranged from 40 to 60, even reaching at times 75, per 1,000.

Neither the need for three-roomed houses nor the insanitary character of the existing houses having been recognised, no attempts were made until recently to provide cottages with fewer than four, five, or six rooms, except that from time to time since 1863 three and four story blocks had been erected by private enterprise; but while each tenement was beyond the needs and means of the very poor, the owners were of opinion that the rentals of 1s. 3d. to 1s. 6d. per room did not give a return for the capital invested. Those erected by the Corporation dated from 1868, when six large blocks three to five stories

* Abstract of paper read before the Epidemiological Society, February, 1900.

in height, each containing four, three, and two-roomed tenements, were put up and let at 1s. 5d. per room, and included Victoria Square, opened in 1885; Juvenal Dwellings, in 1895; and Arley Street and Gildart's Gardens, in 1897. They were controlled by a resident superintendent and an assistant, who collected the rents, the management of the entire property being vested in sub-committees of the Corporation. Dr. Hope gave full details of the numbers of tenements with one, two, and three or four rooms respectively, the rental of each and the dimensions of the several rooms, as well as the returns of original cost, and annual income and expenditure on each estate, which might be summed up by the statement that 90 three-roomed, 300 two-roomed, and 70 single-roomed tenements at rents of from 2s. to 3s. for the last, 3s. to 5s. for the two-roomed, and 4s. 6d. to 5s. 6d. for the largest, gave a net profit of $2\frac{1}{2}$ to $4\frac{1}{2}$ per cent. on the outlay. Another property was in course of development, to comprise 132 and ultimately 182 tenements, mostly two-roomed, but in some respects an improvement on those already described; for while the earlier tenements were provided with w.c.'s on the landings, one to each two or three families, every one of the new tenements would have its own, and hot water would be laid on to the sinks, for which 6d. a week would be added to the rent. Gas would be supplied through automatic meters, and provision made for storage of fuel, and of food in a locker ventilated from the outer air. There would be also a large recreation and reading room for the tenants.

Mr. Shirley Murphy, referring to Dr. Hope's statement that the death-rate in the new buildings did not exceed twenty-one or twenty-two, remarked that the death-rate was determined far more by the habits of the occupants than by the sanitary conditions of the dwellings. He did not doubt that when, in course of time, the dwellings recently erected by the London County Council passed into the occupation of a lower class, the mortality would be much higher than at present.

Dr. Newsholme admitted that the displaced population did not to any great extent return, but the public benefit was none the less, each class or stratum securing a higher standard of accommodation than it had enjoyed before; and whether the lowest were or were not elevated by their removal to a better class of dwellings, there was no doubt that the unavoidable occupation of insanitary houses by the better class of working-men tended to drag them down.

Dr. Willoughby had always maintained that the only permanent solution of the housing of the very poor would be found in the provision of dwellings that, while fulfilling the necessary conditions of decency, health, and cleanliness, should not be such as to attract—should not be good enough for the skilled artisan and better class of working people.

REVIEW OF RECENT BACTERIOLOGY.

THE THERMAL DEATH-POINT OF BACILLUS TUBERCULOSIS.—The importance of an accurate knowledge on this point is obvious in connection with the question as to how far the Pasteurization of milk or the cooking of meat destroys the infectivity of the tubercle bacillus. For the Pasteurization of milk a temperature of 68-70° C. is recommended by probably the majority of authorities, but in practice temperatures as low as 62° C. are sometimes used; whilst the temperature of the interior of an ordinary joint of meat does not during cooking usually rise much over 65° C.* The question as to whether such temperatures

* See PUBLIC HEALTH, x., p. 235 (April, 1898).

under the conditions applying are sufficient to destroy the life or virulence of a particular bacillus would appear to be easy of solution. But as a matter of fact there has been, and still is, considerable discrepancy in the experimental results obtained by different observers. Thus, Schill and Fischer (1884) found that the exposure of tubercular sputum to steam at 100° C. for from two to five minutes did not destroy its infectivity with absolute certainty, since in at least one case such sputum, after two minutes' exposure, proved capable of infecting a guinea-pig. Sternberg (1887) found that tubercular sputum lost its specific virulence after exposure to steam at 60° C. for ten minutes. Yersin (1888) found that cultures of the bacillus in bouillon were not affected by a temperature of 60° C. applied for ten minutes, but were killed by a similar exposure to a temperature of 70° C. Grancher and Ledoux-Lebard (1892) found that the virulence of the bacillus was lowered after exposure to moist heat at 60° C., and destroyed at 70° C., the duration of exposure being in either case five minutes. The last-named observers found that if the cultures were first dried by a gentle heat, the apparent resistance to a high temperature (dry heat) was increased, and that their virulence was retained after heating at 70° C. for seven hours. Such dried cultures subjected to a temperature (dry) of 100° C. for one, two, or three hours gradually lost their virulence up to a certain point, but not entirely, even after the longest period of exposure. De Man (1893) found that caseous material from a cow's udder was still infective after being heated at 60° C. for forty-five minutes; a temperature of 60° C. applied for sixty minutes was required to destroy the virulence of such material, or of tubercular sputum. This question as it applies more particularly to milk has recently been investigated by Theobald Smith,[†] and by Galtier.[‡] Theobald Smith's experiments were carried out with cultures of the bacillus derived from human and bovine sources, and from a case of swine tuberculosis. The experiments showed that, whether suspended in distilled water, normal saline solution, or bouillon, the bacilli were usually destroyed by an exposure of fifteen to twenty minutes at a temperature of 60° C. In one experiment the culture suspended in distilled water was still virulent. In the case of cultures suspended in milk the results were not uniform. At one time the milk suspension was found to be innocuous after twenty minutes at 60° C., whilst at others an exposure of sixty minutes did not destroy the virulence. This discrepancy is attributed to the fact that at 60° C. a film forms on the surface of the milk, by which, it is thought, the bacilli may be protected to some extent from the effect of the heat. Galtier in the course of his experiments found that exposure for six minutes at temperatures between 70° C. and 85° C. did not completely destroy the virulence of infected milk when subsequently tested by injection into the peritoneum of the guinea-pig. Guinea-pigs also contracted tuberculosis when fed on such infected milk which had been heated for from five to twenty minutes at 75° C. Tubercular tissue, after being heated for one hour at 110° C., produced no ill effects when administered by the mouth.

THE DISINFECTION OF ROOMS.—Two valuable reports on room-disinfection by E. L. Marsh, Special Plague Medical Officer, were issued by the Indian Government last year. The first report, deals with a rather

* *Journal of Experimental Medicine*, vol. iv, March, 1899.

† *Société de Biologie*, 3 Février, 1900.

‡ "Report on the Efficiency of Perchloride of Mercury, in Disinfectant Solution, as an Application to Cowdung Floors," etc., Bombay, 1899.

difficult problem in disinfection arising from the fact that the floors of ordinary native dwellings in Bombay are coated with a mixture of cowdung and mud. Such floors are said not to be objectionable in a general way, but are not easily disinfected after the occurrence of a case of plague in the house. Numerous experiments are described. It was found that a solution of 1 in 5,000 perchloride of mercury, which will, after a short exposure, kill an agar culture of the plague bacillus, was useless for the purposes of practical sanitation under the given conditions. Thus, it was found that 10 c.c. of a 1 in 725 acid solution was required to disinfect 1.5 gramme of dust from such a floor after it had been experimentally infected with the plague bacillus. The same quantity of disinfectant was required to kill the bacillus in 0.7 gramme of the floor itself. This proportion of disinfectant reduced the number of, but did not entirely suppress, the more resistant saprophytic bacteria present at the same time. The practical result arrived at was, that in order to disinfect such a floor (so far as the plague organism is concerned) to a depth of one-sixteenth of an inch, it would be necessary to use at least eight gallons of the 1 in 725 solution for every hundred square feet of floor surface. It was found that the application of electrolyzed sea-water enabled a subsequent application of the perchloride of mercury solution to act more efficiently. The other report* deals with the general disinfection of rooms after the occurrence of cases of plague. Experiments were carried out with Lingner's apparatus, by means of which so-called "glycoformal" (formaldehyde 30 parts, glycerine 10 parts, water 60 parts) is sprayed into the room, two litres of the solution being used for every 2,800 cubic feet of air-space. Tests carried out under practical conditions led up to the following conclusions: That formaldehyde as vapourized by this method has a high general average of efficiency as a disinfectant; that it is able to kill crowded moist and dry cultures of microbes when they are freely exposed to the vapour, or when they are covered, on a flat surface, by one to three layers of thin, porous material; but that in small confined spaces (such as the lumen of a test-tube exposed in a room which is being disinfected) the results are inconstant, because of the faulty diffusibility of the vapour. "When only a superficial disinfection of rooms is aimed at, the sterilization of dust in the air, of dust on exposed articles of furniture or apparel, and of dust and dry cowdung on the floor and walls, may be considered as nearly absolute."

THE DETECTION OF "BACILLUS TYPHOSUS" IN WATER AND OTHER SUBSTANCES.—Hankin,† employing a modification of the well-known method of Parietti, claims that he has repeatedly been able to demonstrate the presence of *Bacillus typhosus* in the water of piped supplies in Agra in which sand filtration had been employed, and also in some earth 6 inches from the surface of the foreshore of a village on the banks of the Jumna. Until, however, some additional confirmation is obtained, Hankin's interpretation of his results must be accepted with some reserve. The facility with which the organism appears to have been isolated is strangely at variance with the experience of the most able bacteriologists, who, using practically similar methods for many years, have experienced the greatest possible difficulty in attempting the identification of this bacillus in contaminated water supplies.

* "Report on the Disinfection of Native Dwellings by Formaldehyde Vapour, with special reference to the Utility of the Apparatus of Lingner." Bombay, 1899.

† *Centralblatt für Bacteriologie*, Bd. xxvi., Nos. 18, 19, 1899.

ANALYTICAL NOTES.

THE ACTION OF FORMALDEHYDE ON PROTEIDS.* C. LEPIERRE. The author has studied the action of formaldehyde on certain soluble proteid substances which do not coagulate on heating. From the results of his experiments he concludes that the action is one of dehydration and condensation, with the fixation of one or more CH_2 groups. He finds that proto-albumoses (from muscle-fibrin and egg-albumin) are rendered completely insoluble, and the precipitate does not dissolve in hot water, in a 10 per cent. solution of sodium chloride (exclusion of hetero-albumoses) or in sodium carbonate solution. Deutero-albumoses are, in his opinion, not simple substances, but consist of a series of analogous bodies conveniently grouped together. Of these the members of higher molecular weight—i.e., those approaching most nearly in co-position to the proto-albumoses—become insoluble on treatment with formaldehyde, whilst those of lower molecular weight, approaching the true peptones, are converted into proto-albumoses; and only after a long-continued action of the reagent are the latter transformed into insoluble derivatives. In like manner true peptones are said to be first converted into substances of a deutero-albumose nature, and these in turn into proto-albumoses. The precipitates obtained from these different proteids are insoluble in cold or boiling water, but when heated for one or two hours in an autoclave at 110°C . are hydrated and rendered completely soluble, the solutions giving the characteristic reactions of the proteids from which the insoluble compounds are derived. Contrary to the experience of Trillat, the author has found that proteids rendered insoluble are not altogether indigestible, but are dissolved by normal gastric juice, although more slowly than the untreated proteids. With reference to the use of formaldehyde for the separation of gelatin from peptones in analytical work (*Analyst*, xx. 41 and 247), it is stated that a certain amount of the peptones present are precipitated simultaneously with the gelatin, the proportion varying with the duration of the action of the formaldehyde and the nature of the peptones.—*Analyst*.

THE USE OF SOZOIODOL AS A REAGENT FOR ALBUMINOUS SUBSTANCES IN URINE.† G. GUÉRIN. Soziodol, or di-iodo-para-phenyl-sulphonic acid, is said to be a very sensitive reagent for abnormal albuminous substances in urine. On adding ten to fifteen drops of a 10 per cent. aqueous solution of this reagent to 8 or 10 c.c. of the filtered urine, a milky turbidity or white flocculent precipitate is produced in the presence of albuminous substances. Alkaline urates and uric acid give no reaction, whilst albumoses, peptones, and the majority of alkaloids give a precipitate which is soluble on warming. On the other hand, nucleo-albumins give only a slight turbidity in the cold, but on heating become completely insoluble. As the reagent undergoes alteration in the light, it should be preserved in orange-coloured bottles.—*Analyst*.

DETECTION OF ALDEHYDE.‡ Hermann Blaser recommends for the detection of small traces of aldehyde the use of a solution of fuchsin 1 : 100,000, which has been bleached by exposure to sunlight, in preference to the solution by sulphurous acid.

* *Bull. Soc. Chim.*, 1899, xvi. 729-738.

† *Journ. Pharm. Chim.*, 1899, ix. 576.

‡ *Pharm. Centralbl.*, xl. 607, through *Pharmaceutical Journal*.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

April 12th and 13th, 1899.

BEFORE DARLING AND CHANNELL, JJ.

SYKES AND ANOTHER v. SOWERBY URBAN DISTRICT COUNCIL.

Local Government—Sewer Made for "profit"—Discharge of Surface Water—Absence of Direct Profit—Vesting of Sewer in Local Authority—Public Health Act, 1875 (38 and 39 Vic., cap. 55), Section 13.

A sewer constructed by a landowner in order to prevent surface water from running into the workings of a stone quarry upon his land, but which is not directly profitable to him, is not a sewer made by him "for his own profit" within the meaning of Section 13, Sub-section 1 of the Public Health Act, 1875, and therefore vests in the local authority.

Appeal from the Judge of the Halifax County Court.

The plaintiffs, who were quarry-owners, had about twenty years ago constructed a drain to collect into one channel the surface and rain water which came down a lane, called Carr Lane, on to their land. The drain was constructed in order that the water might not run into the workings of the plaintiffs' quarry. Subsequently the plaintiffs altered the course of the drain, and afterwards made another drain for the same purpose across a field belonging to them. The defendants caused a current of polluted water to flow into the drain, and so into a public sewer in an adjoining road.

The plaintiffs alleged that the drain was their private drain, and that the discharge of water into it caused them damage by reason of percolation into their quarry, rendering the stone wet, and causing them greater expense in working the quarry.

The County Court Judge held that the drain was a sewer made for the "profit" of the plaintiffs within the meaning of Section 13, Sub-section 1 of the Public Health Act, 1875, and accordingly gave judgment for the plaintiffs.

The defendants appealed.

Lawson Walton, Q.C. (W. J. Waugh with him), for the defendants.—This sewer was not constructed for the plaintiffs' own "profit." If a sewer is made for the purpose of relieving land of a burden of water, it is not constructed for the profit of the landowner. There can be no distinction for this purpose between house drainage and surface drainage. Section 308 of the Act of 1875 provides for compensation where damage is caused to any person by the local authority, but the procedure prescribed in the section must be followed. In *Acton Local Board v. Batten* [1884]* it was held that a sewer made by the owner of some of the houses in a street, though made for the purpose of draining

* 54 L. J., Ch. 251; 28 Ch. D., 283.

his own amongst the others, was not a sewer made by him "for his own profit" within the meaning of Section 13, Sub-section 1.

[He also referred to *Bonella v. Twickenham Local Board* (1887),* *Ferrand v. Hallas Land and Building Co.* (1893),† and *Croysdale v. Sunbury-on-Thames Urban Council* (1898).‡]

Butcher, Q.C. (T. F. Byrne with him), for the plaintiffs.—This sewer is within the exception in Section 13, Sub-section 1. If it were held to be a sewer vesting in the local authority, every drain for draining agricultural land would vest in them, and could not be altered without their consent, and the local authority would be bound for ever to repair it. There is no analogy between house drainage and surface water. The cases cited on behalf of the defendants were cases of house sewage. They are of an exceptional character, and different from the present. In the case of a house it is absolutely necessary to carry away the sewage, but that is not so in the case of surface water. In *Minehead Local Board v. Luttrell* [1894]§ it was held that sewers made by a landowner to drain a town, part of which stood on his lands, and for the use of which sewers he was paid a sewer rate, were sewers made by him "for his own profit." There is nothing either in the Act or in the cases cited to show that in order to bring a sewer within Sub-section 1 of Section 13 it is necessary that the article passing through the sewer should be utilized for any purpose after it has passed through.

Lawson Walton, Q.C., replied.

DARLING, J.—I have come to the conclusion that this appeal ought to be allowed after great hesitation and great difficulty in endeavouring to reconcile the decisions with the language of the Act. But, on the whole, I think that this sewer was not a sewer made by the owners for their own "profit," so as to bring it within the first exception in Section 13. It appears to have been a sewer constructed in order to prevent the surface water coming down Carr Lane from running into the plaintiffs' quarry, and there can be no doubt that if the water had got into the quarry it would have rendered the quarry less profitable to the plaintiffs. The difficulty I have felt arises from the fact that the sewer was clearly not directly profitable to the plaintiffs, because the water was not capable of being sold at a profit; but there can be no doubt that there must have been a detriment to the plaintiffs if the water had been allowed to flow down into their quarry. I have only come to the conclusion that this sewer was not made for the plaintiffs' own profit, because of the cases which have been cited. In *Ferrand v. Hallas Land and Building Co.*, Lord Justice A. L. Smith said: "It is, however, not necessary to speculate what would or would not be a sewer made by a person for his own profit, for I am clearly of opinion that a sewer made merely for the purpose of draining premises and for no other purpose, as in the present case, is not a sewer made 'for profit' within the meaning of the exception; first, because it does not come within the ordinary meaning of the terms used; and secondly, because, as was pointed out by Mr. Justice Kay in *Acton Local Board v. Batten*, and by Lord Justice Fry in *Bonella v. Twickenham Local Board*, if it did, 'the exception would almost eat up the rule.'" That is the language which gives rise to the difficulty which I feel in holding such a sewer as the one in question to be a sewer made by the

* 56 L. J., M.C., 73; 18 Q.B.D., 577.

† 62 L. J., Q.B., 479; [1893] 2 Q.B., 135.

‡ 67 L. J., Ch. 585; [1898] 2 Ch. 515.

§ 63 L. J., Ch. 497; [1894] 2 Ch. 178.

plaintiffs for their own profit. It would be making the word "profit" equivalent to "benefit," and, if so, every drain would be included in the exception. A restricted meaning must therefore be placed upon the term. The case of *Minehead Local Board v. Luttrell* caused me some difficulty. Mr. Justice Romer there said: "This is a case where the defendant has laid out money for the purpose of making sewers, intending to be compensated and paid directly for his expenditure on the sewers by receiving payments from all persons, whether they are his tenants or not, who avail themselves of the benefit of his sewers, and where he intended to receive, and did receive, payment direct to him from the persons using his sewers for the benefit of his sewers, and where he has, by reason of his expenditure, received direct remuneration for the expenditure in the way I have indicated." There Mr. Justice Romer held that it was a sewer within the first exception in Section 13, but he seems to have done so on the ground that the sewer brought profit directly to the defendant, and not merely indirectly. Applying that to the present case, this drain did not give a direct, but only an indirect, profit to the plaintiffs, and is not therefore within the principle of that decision. It seems to me that the decision most in favour of the plaintiffs' contention is *Croysdale v. Sunbury-on-Thames Urban Council*. Mr. Justice Stirling there said: "When the object of making the sewer is not either for sanitary or ordinary drainage purposes, but to enable the land to be occupied more profitably or to avoid an expenditure which would otherwise have to be incurred in order that the occupation might be equally beneficial, it seems to me that the sewer is made for the profit of the occupier." If taken alone, those words are wide enough to cover the present case. This sewer was not made for sanitary or for ordinary drainage purposes, and would seem to come within the expression "to avoid an expenditure" which would otherwise have had to be incurred. The learned Judge, however, was dealing with a case where a former tenant of the land in question had put in the pipes for the conveyance of water, not only to get rid of it, but to carry it to a pond for the use of cattle, so obviating an expenditure there, and therefore the case is more within the cases where a person has carried something through a drain for the purpose of using it at the other end. The decision does not therefore cover the present case.

CHANNELL, J.—I agree. The decided cases have established that the word "profit" in Section 13, Sub-section 1, means some advantage to a person other than using the pipe simply as a sewer or drain. If a drain is made in order to take away water somewhere else, that is an ordinary drainage purpose, and the cases have decided that such a drain is not for the "profit" of the person making it within the meaning of Section 13, Sub-section 1, because, if so, all drains would be drains made for profit. The cases are clear where the drain carries sewage, but it was said that, although that might be the rule where there was what may be called a necessity, it did not apply to other cases. It seems to me, however, that no such distinction can be drawn. If it were an open question, we might perhaps have thought that this sewer was made for the plaintiffs' own profit; but we cannot so hold in view of the authorities. I think that the County Court Judge was wrong, and that we are bound to allow the appeal.

Appeal allowed.

COURT OF APPEAL.

Thursday, February 22nd, 1900.

BEFORE A. L. SMITH, COLLINS, AND ROMER, L.JJ.

SYKES AND ANOTHER v. SOWERBY URBAN DISTRICT COUNCIL.

This was an appeal by the plaintiffs from the decision of the Divisional Court (Mr. Justice Darling and Mr. Justice Channell), reversing the judgment of the Halifax County Court Judge (*vide supra*). *Butcher, Q.C.* (T. F. Byrne with him), appeared for the plaintiffs; *J. Lawson Walton, Q.C.* (W. J. Waugh with him), appeared for the defendants.

A. L. SMITH, L.J., said that he agreed that this drain was a "sewer" within the Public Health Act, 1875. The County Court Judge found that the drain was constructed for the more economical and convenient working of the quarry, and in order that the land might be worked more profitably, and that as the drain was not made for sanitary drainage purposes, but for the more beneficial use and occupation of the land, it was a sewer made by the plaintiffs for their own profit within exception (1) in Section 13. The Divisional Court reversed that decision. Section 4 of the Public Health Act, 1875, defined "drain" as "any drain of and used for the drainage of one building only, or premises within the same curtilage, and made merely for the purpose of communicating therefrom with a cesspool or other like receptacle for drainage, or with a sewer into which the drainage of two or more buildings or premises occupied by different persons is conveyed." The drain in the present case was not a "drain" within that definition. A "sewer" was defined in Section 4 as including "sewers and drains of every description, except drains to which the word 'drain,' interpreted as aforesaid, applies, and except drains vested in or under the control of any authority having the management of roads and not being a local authority under this Act." In his Lordship's opinion this drain was a "sewer" within that definition. That being so, did it vest in the defendants as the local authority? That depended upon Section 13, which was in Part 3 of the Act, headed "Sanitary Provisions." That section provided that all existing and future sewers should vest in the local authority, except, first, "sewers made by any person for his own profit." Those words had been the subject of decision on many occasions. The decisions showed that house drains did not come within the exception. The drain in the present case was not a house drain. Considering the findings of the County Court Judge, why was it not a drain made for the plaintiffs' profit? It was made in order that they might work the quarry more economically and conveniently. In *Minehead Local Board v. Luttrell* (1894, 2 Ch., 178) Mr. Justice Romer went through the prior authorities, and pointed out that all of them related to house drains. It was there held that sewers made by a landowner for the purpose of draining a town, the greater part of which stood on his own lands, and for the use of which sewers he levied and was paid a sewer rate by all persons whose houses were connected with his sewers, were sewers made by him for his own profit, and did not vest in the local authority. Then, in *Croysdale v. Sunbury-on-Thames Urban Council* (1898, 2 Ch., 515) Mr. Justice Stirling held that a sewer which was not made for ordinary drainage purposes, but to enable the land on which it was made to be occupied

more profitably, or to avoid expenditure which would otherwise have to be incurred in order that the occupation might be equally beneficial, was made for the profit of the owner within the meaning of the Section, and did not vest in the local authority. Upon the facts and findings of the County Court Judge in the present case, he (the Lord Justice) was of opinion that this sewer was made for the profit of the plaintiff within exception (1) in Section 13, and therefore did not vest in the defendants. The appeal must therefore be allowed.

COLLINS, L.J., concurred. It would seem as if the definitions in Section 4 swept everything which could be described as a drain into the ambit of the Public Health Act, 1875, and though the provisions of Part 3 of the Act were described as "Sanitary Provisions," a drain made for a non-sanitary purpose, *prima facie*, would come within the Act. How were such drains excluded from the Act? That was done by introducing exceptions in Section 13. An ordinary agricultural drain would, apart from the exceptions, be swept into the ambit of the Act, and it was only got out of the Act by means of exception (1) in Section 13. In his opinion this drain was made for the profit of the plaintiffs within the meaning of the exception, and therefore did not vest in the defendants.

ROMER, L.J., delivered judgment to the same effect.

Appeal allowed.

PURE BUTTER.—At the Rhyl County Court, on March 16th, Judge Lloyd had before him the case of *Roose and Co. v. Parry and Co.*, in which the plaintiffs sued to recover damages for breach of warranty and expenses incurred in defending a prosecution in respect of certain butter sold to them by the defendants as pure, but in which the Flintshire Analyst found boric acid to the amount of 10 grains to the pound. The plaintiffs had been summoned under the Sale of Food and Drugs Acts, but the case against them was dismissed, as they were able to prove a warranty from the defendants. The point at issue was whether butter containing the amount of boric acid mentioned was "pure" butter. His Honour decided in favour of the plaintiffs, and awarded £2 2s. damages, with costs. Leave to appeal "within ten days" was granted.

GOLDEN SYRUP.—At the Liverpool City Sessions, on March 13th, an appeal was heard against a conviction (involving a fine of £5 with costs) for selling as "golden syrup" a compound containing 70 per cent. of glucose syrup. The point at issue was whether "golden syrup" was a name restricted to syrup made from sugar-cane. The Recorder decided that it was so restricted, and confirmed the conviction. It is probable that the case will be taken further.

REVIEWS.

REPORTS TO THE LOCAL GOVERNMENT BOARD ON RURAL SANITATION:

(1) Dr. F. St. George Mivart's Report to the Local Government Board on the General Sanitary Circumstances and Administration of the Axminster Rural District, August 10, 1899.

(2) Dr. F. St. George Mivart's Report to the Local Government Board on the General Circumstances and Administration of the Chailey Rural District, October 10th, 1899.

Axminster Rural District occupies the south-eastern extremity of the county of Devon. It contains fifteen contributory parishes, most of

them being but sparsely populated. Axminster, Colyton, and Beer are the most populous villages in the district.

The conditions discovered by Dr. Mivart are certainly astonishing. Notwithstanding the social improvements which we congratulate ourselves have been achieved during this century, we find that such primitive conditions prevail here that it would hardly cause surprise were the Inspector to report that the inhabitants still stained themselves with woad. In fact, at Axmouth (a parish of 4,244 acres and a population of 615) many of the houses appear to be no better than cave-dwellings, being built back-to-earth, and some also having the ground up to the level of the sill of the window of the living-room in front. Walls, which are in many cases of the flimsiest kind, are often cracked, thatched roofs are rotten, floors irregular and foul. The arrangements for excrement and refuse disposal throughout the district are very unsatisfactory. Many houses were unprovided with privy or closet of any kind, the inhabitants stating that "they have to do the best they can," which means that the garden-ground, where such exists, the roadway or the wayside gutter, whichever may be most convenient, become contaminated. Where privies do exist, they are often so placed as to cause dampness to houses or contamination to wells and streams. Thus, although water is abundant in streams and wells, too often it has been rendered unfit for use, and considerable hardship, and even suffering, have been endured by the inhabitants of some of the villages in consequence.

From the facts given in the report, it is evident that the Rural District Council have shown themselves lamentably deficient in their duty as regards the many and serious wants of this district, and that they have sinned with their eyes open to the existing evils. In 1874 Dr. Blaxall sent them a series of recommendations dealing chiefly with the conditions in the little town of Axminster. The medical officer of health, who gets £45 a year, and the inspector of nuisances, who gets £50, have both drawn the attention of the District Council to the enormous number of nuisances of all kinds existing in the district, but no action has been taken. Since parish councils have been formed, strong opinions appear to have been expressed at the failure of the District Council, and it is certainly a most hopeful sign that the inhabitants are now awake to the evil of the conditions in their midst. The District Council have in the past acquired a variety of powers under various sections of the Public Health and other Acts, but they have failed to put them into force. What is wanted now is that they should vigorously exercise the powers they possess, and when improvements are attempted they should see that supervision is given so that they are carried out on right lines. It can scarcely be called an "improvement" to substitute for the primitive conditions already mentioned an untrapped closet in an unventilated living-room, so that the house was pervaded by a sickening stench.

Owners of property should be compelled to put and to keep their houses in proper repair, and to remove the many insanitary conditions existing in connection with them. Many of the houses have been badly built from the first, and some difficulty in dealing with the matter is doubtless raised by the custom prevalent in the district of granting leases for the term of a life or of lives. The uncertainty of this tenure is the cause of a not wholly unreasonable objection to the outlay of the sum of money necessary for repairs, more especially when the weekly rents of such cottages do not exceed two shillings. This should not

prove an insuperable difficulty to an authority anxious to do its duty, and if landlords refuse to do the right thing the council should erect dwellings and have the old insanitary hovels shut up.

Chailey Rural District is in Sussex, in which county it covers some 50,000 acres in the neighbourhood of the towns of Lewes and Hayward's Heath. Much of the area is rural in character, but being of easy access both from London and Brighton, and of picturesque character, many parts have become the resort of visitors during the summer. Other parishes again are being selected for the erection of substantial houses, and are likely to become more populous in the future. The Rural District Council have not fully realized their growing responsibilities. The three most pressing wants of the district are (1) the provision of a sufficient supply of wholesome water; (2) the removal of the intolerable nuisance caused by the overflow of cesspools and by the general want of drainage in certain parts; and (3) the adoption of regulations and of a code of bye-laws respectively as to dairies, cowsheds, milkshops, and slaughterhouses, together with the systematic registration and inspection of all these places.

Dairy Farming.—Considering that the chief industry of this district is that of cow-keeping and dairy-farming, it does not redound to the credit of the Chailey Council that so many of the cowsheds and milk premises should be allowed to remain in the unwholesome condition described in the report. No wonder it is necessary in order that milk obtained from such places may keep sweet that chemical preservatives must be largely used! Several well-known dairy companies obtain portions of their supplies from the farms in this district, and a great quantity of milk, chiefly separated, and cream are sent to Brighton and to London and its suburbs. Dr. Mivart found the dairies he visited for the most part fairly clean, but the cowsheds showed a noticeable lack of care and attention. Enormous accumulations of manure sometimes piled against the sides of the cowhouses with numerous pools of liquid filth in the centre of the foldyard call for the intervention of the District Council. In many cases the farmyards were found to be almost ankle-deep in foul slush, and remonstrance at once elicited the reply that farmyards were always dirty. Surely the "well-known dairy companies" supplied from such sources have not taken the precaution of examining these farms. It might have been well had Dr. Mivart given the names of the companies. But there are other matters of which to complain. Attention must also be drawn to the practice, now very prevalent, of carrying out the process of cooling the milk either in the open cowhouse or in a small portion of it, more or less imperfectly screened off from the main body of the structure. In such places the floors are too frequently inadequately cleansed, in some, indeed, they seem rarely to be so, and risk to the milk there dealt with must be considerable. The amount of cubic space and the means of ventilation of cowhouses were frequently insufficient. In a number of cases, too, the water supply was found to be of a very suspicious character, being taken from shallow, dry stoned wells actually sunk in the farmyards or their close vicinity. In one case—a farm sending milk to Brighton—the milk-vessels were washed with cold water taken from a brick-cemented rain-water tank sunk in the ground. The cover had apparently, from its appearance, been removed for some little time. Upon the ground round about the large opening of this tank was lying a quantity of human excrement. The cowman informed Dr. Mivart that the farm hands, not being provided with any privy at all, resorted for

their convenience to the vicinity of this water-tank, which is situated in a retired spot behind one of the cowhouses.

In the Axminster district dairy work is also largely engaged in. The greater part of the milk is used in butter-making, but in one case Dr. Mivart found milk was sent daily to London. Nearly all the dairies in this locality were found to present grave defects, such as the storage of milk in ill-ventilated apartments forming a portion of, or contiguous to, living rooms, proximity of filthy privies, or accumulations of refuse to the dairy place, absence of water supply, or use of water from wells probably contaminated, and general want of cleanliness. Most of the cowhouses were dirty and ill-kept. It is noteworthy that in 1882 Dr. Parsons investigated an outbreak of enteric fever at Clapham, and showed that it was apparently connected with milk supplied from certain dairies in the Axminster rural district.

Surely it is time that the Local Government Board had power to insist on the carrying out of the recommendations of its Medical Inspectors.

CORRESPONDENCE.

SANITARY MALADMINISTRATION.

TO THE EDITOR OF "PUBLIC HEALTH."

SIR,

It is curious that Mr. Mark H. Judge,* who objects to such terms as "whenever practicable," "as near as practicable," etc., as leading to endless disputes, should at the same time urge that they should be avoided "where possible." Surely this phrase is quite as much void for uncertainty as those to which objection is taken. Who is to decide what is possible, if he cannot determine what is practicable?

I am, etc.,

A MEDICAL OFFICER OF HEALTH.

March, 1900.

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* See p. 484 of our last issue.

APPOINTMENTS.

- Berry, F. C., M.D.**, reappointed M.O.H. of Burnham (Somerset) Urban Sanitary District.
- Bone, B. M., M.B.**, reappointed M.O.H. of Towyn Urban Sanitary District.
- Boyd, J. J., M.B.**, appointed Assistant-M.O.H. of Southampton County Borough and Port.
- Docker, W. B., M.B.**, appointed M.O.H. of Boro' Portland, Victoria.
- Dunlop, T., M.B.**, appointed M.O.H. of Aldershot Urban Sanitary District.
- Hitchins, C. V., M.R.C.S.**, reappointed M.O.H. of Weston-super-Mare Urban Sanitary District.
- Jones, R., M.D.**, reappointed M.O.H. of Blaenau Festiniog Urban Sanitary District.
- Mason, W., L.R.C.P., L.R.C.S.**, appointed M.O.H. of St. Anstell (Cornwall) Urban Sanitary District.
- Mercer, W. B., M.B.**, appointed M.O.H. of Rushworth Urban Sanitary District.
- Michell, J. C., M.R.C.S.**, reappointed M.O.H. of Lynton (Devon) Urban Sanitary District.
- Mudge, Z. B., M.R.C.S.**, reappointed M.O.H. of Phillack (Cornwall) Urban Sanitary District.
- Murison, P., M.B.**, appointed M.O.H. of Sutherlandshire.
- Mussen, A. A., M.D.**, appointed Assistant-M.O.H. of Liverpool City and Port.
- Nettle, W., M.R.C.S.**, reappointed M.O.H. of Liskeard Urban Sanitary District.
- Ritchie, R. H., M.B.**, appointed M.O.H. of Boro' Horsham, Victoria.
- Smith, E. M., M.D.**, appointed M.O.H. of York City.
- Steegman, E. T., M.B.**, appointed Assistant-Lecturer on Hygiene and Public Health, St. Mary's Hospital Medical School.
- Vickers, C. W., M.R.C.S.**, reappointed M.O.H. of Paignton (Devon) Urban Sanitary District.
- Weaver, J. J., M.R.C.S.**, appointed M.O.H. of Southport Urban Sanitary District.

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PUBLIC HEALTH:

The Journal of the Incorporated Society of
Medical Officers of Health.

VOL. XII. No. 8.

MAY, 1900.

EDITORIAL.

CONTROL OF PUBLIC WATER-SUPPLIES.*

ALTHOUGH the Royal Commission presided over by Viscount Llandaff was "appointed to inquire into the subject of the water-supply within the limits of the Metropolitan water companies," we think that the final report of the Commission, or at all events the concluding section thereof, has an interest of much wider extent. We say this because we feel that it will in the future be practically impossible for Parliament to refuse to grant to extra-Metropolitan authorities powers of control such as the Commissioners recommend. Whatever may be the final result of the Commission as regards Metropolitan supply, we think that the report now before us is likely to mark an epoch in legislation on the subject generally. Before, however, proceeding to consider the recommendations of the Commissioners on the subject of control, we should like to comment briefly on the conclusions arrived at on the subject of Metropolitan water-supply.

Having before them the information collected by the Balfour Commission, supplemented by additional evidence submitted by the water companies, the London County Council, and other interested parties, and after carefully examining the circumstances and effects of the recent years of extreme drought, this last Commission endorse the views already promulgated as to the suitability and adequacy of the supplies drawn from the Thames and Lea Valleys and from the Kent wells, and express the opinion that those supplies will, with adequately increased storage accommodation, suffice for the needs of the present area of "Water London" until the year 1941, a date which is ten years later than that mentioned by the Balfour

* See also Bills before Parliament—Water Bill, p. 624.

Commission. As to the scheme for procuring a new supply from Wales, originally suggested as the substitute for that drawn from the present sources, but latterly only as supplementary thereto, the Commissioners observe that "there is much, no doubt, to be said in favour" of such supplementary supply, but "think that to cast aside that source of supply (the Thames, Lea, etc.) for the future, and to incur at once the far larger expenditure involved . . . is needlessly to aggravate the financial difficulties which must attend the purchase of the water undertakings, and to throw an unnecessary burden on the present and next generation of rate-payers and their immediate successors." The Commissioners are of opinion that it is desirable on financial and other grounds that the "undertakings of the water companies should be acquired and managed by a public authority," but recommend that the London County Council should not be that authority. The opposition offered by the authorities of areas outside administrative London now supplied by the water companies to any proposal to entrust the water-supply to the County Council is remarkable for the complete mistrust they one and all exhibit of that body. The Commissioners recommend that a new Water Board of an almost permanent constitution should be formed by nomination of certain existing authorities, not by direct election. The new Board is to purchase the water undertakings either by agreement or by arbitration on terms usual in cases of compulsory purchase, not under special terms as urged by the London County Council. The other parts of the report, which in general follows very closely that of the Balfour Commission, being chiefly financial and administrative, call for no comment here. As was to be expected, the Bills promoted in the current Session of Parliament by the London County Council, being contrary to the recommendations of the Commission, were thrown out on the second readings or withdrawn by the Council, and it now remains for the Government to bring forward legislation to give effect to the recommendations which have been put forward by two Royal Commissions.

We can now proceed to deal briefly with the (to us) more interesting recommendations with regard to control. We must first premise that many of the recommendations are peculiar to the sources from which the Metropolitan water-supply is drawn, and others extensions of existing powers for regulating the supply.

The first recommendation deals with the question of gauging the amounts drawn daily from the Thames and Lea. It is essential that the rivers should be sufficiently husbanded to preserve the water for the purposes of navigation, etc., and to enable the

companies or water authority to take the full amount to which they are entitled. At present the Commissioners think the Thames Conservators have sufficient powers, and that they are properly exercised, but they think otherwise as regards the Lea. Where a domestic supply is drawn from a navigable river similar control must be exercised.

The next matter is that of subsidence by storage and filtration, closely associated with which points is the question of taking water at all during floods. The Commissioners concluded, after examining all the evidence, that the latter question might be left to the engineers, and made no direct recommendation. They express the opinion that all water taken from the river should be stored in subsidence-tanks prior to filtration. Questions such as the construction of filter-beds, rate of filtration, etc., the Commissioners consider to be as yet unripe for regulations; but they recommend that each filter-bed should discharge into its own filter-well, and should automatically record its rate of filtration (per square foot).

The Commissioners have very definite opinions on the matter of inspection, and recommend that the water examiner, appointed under the Metropolis Water Act, 1871, should have power to enter all waterworks, take samples as may appear to him necessary, and even to prohibit the distribution of any water which he may deem unfit for consumption. They also recommend that bacteriological laboratories should be provided (by the companies) in or close to the various waterworks. Under the Metropolis Water Act, 1871, the Local Government Board can hold inquiries into the quality of the water supplied. The Commissioners recommend that the powers of an inspector holding such inquiry should be enlarged to agree with those which he has under the Public Health Act, 1875. They further recommend that the examinations of the water now regularly made by the Local Government Board should be extended and be more frequent. The Board should also have power to hold inquiries as to complaints from any local authority, or on the Board's own initiative. Suggestions laid before the Commission that the metropolitan local authorities should have powers conferred on them to enter the premises of the water companies, take samples, etc., are rejected by the Commissioners on the grounds that duplicate control is undesirable, and that "the local authorities have used existing powers of control with so little zeal and efficiency that we are less disposed to recommend that additional powers should be vested in them."

Many of the authorities in the immediate neighbourhood of the

Metropolis complained that the pumping operations of the water companies have drained the outlying wells and water-sources. The Commissioners do not express any definite opinions as to the complaints, but point out that even if such complaints be true, the companies are doing no more than they are entitled to by law. They recommend, however, that the recommendation of the Balfour Commission as to the keeping of accurate records of water pumped out, and the effects of such pumping on the level of the wells, etc., should be insisted on.

The next matter is that of fittings, which is to some extent closely associated with the question of waste. The Commissioners appear to think that the wilful waste of water can be in part stopped by enforcing a supply by meter on the wasteful customers. As to waste from defective fittings, it is pointed out that the London County Council have the power to require an occupier to provide proper fittings, but that they have never exercised that power. The Commissioners now recommend that the companies should have the power to require that "all fittings shall be approved and tested by themselves, and shall be renewed or repaired from time to time on their requisition, and brought into conformity with regulations properly framed." It is pointed out that new legislation is not required for this, as the companies have the power to frame the requisite regulations under the Metropolis Water Act, 1871, subject to the approval of the Local Government Board, and the Commissioners blame the companies for not having exercised this power before. The Commissioners recommend that the "body which supplies water, whether the supply be constant or intermittent, should have the power to require that a properly-constructed cistern, approved by them, of dimensions proportionate to the number of persons likely to inhabit the house, should be placed, and should remain in good order and repair, in any house supplied with water; and . . . if the cistern is removed, or is out of order, either to cut off the supply of water to the house or to replace or repair the cistern at the expense primarily of the occupier, and ultimately of the owner of the house. The local authorities, as guardians of the public health, may be empowered to see that the cisterns are properly cleansed, or that their construction is modified so as to prevent fouling of the water; but they should not have power to order the removal of a cistern altogether, unless it is at once replaced by another."

The Commissioners urge the need of codifying the legislation governing the Metropolitan water-supply, a recommendation which, we fancy, will apply to the country generally, and advise that there

should be a statutory obligation on the companies to furnish the Local Government Board with information now given voluntarily. Lastly, they recommend that the Local Government Board should have the power to require the water companies to exercise "prudent foresight" in the direction of increasing plant, area of filter-beds, etc., as may be necessary to meet demands which will naturally arise in connection with the growth of the areas under their jurisdiction.

The Commissioners, in closing their Report, point out that the recommendations they have put forward appear to them "to be equally applicable and desirable, whether the water undertakings be purchased or not." We may add that, *mutatis mutandis*, what is good and desirable for the Metropolis is equally so for other parts of the country.

RESULTS OF MODERN SANITATION IN BUDA PESTH.*—This week Körösy has given us a few figures of some interest concerning the progress of Buda Pesth in sanitation during the last thirty years. The mortality for the last twenty-two years, from 1874 to 1896, has fallen from 44.5 per 1,000 to 24.2 per 1,000, or about a half. From 1886 to 1890 inclusive the average death-rate during the five years was 30.5, while the birth-rate was 37.4 per 1,000, or 6.9 of a natural increase. These figures prove that Buda Pesth is a fairly healthy town notwithstanding the epidemics incidental to its position. The natural increase is worthy of note, which is 6.9 per 1,000; Strasburg having 5.8; Königsberg, 3.9; Liverpool and Bradford, 5.3; and Manchester, 4.7.

The infectious diseases death-rate from 1882 to 1890 was 3.6, of which tuberculosis formed the major part, although this has greatly improved in recent years. From 1875 to 1881 the mortality from tuberculosis alone was 847 per 100,000. During the decennium 1881 to 1890 it was 758, which has now fallen to 520 per 100,000, or 0.5 per 1,000. Between 1888 and 1890 the deaths from pulmonary diseases were 30 per cent. less than in 1875. His statistics tend to show less tuberculosis among the Hebrews than among Catholics, Lutherans, and Calvinists, but when we compare the nature of occupation the comparison is not tenable. In every 1,000 there are 168 Catholics, 125 Lutherans, 148 Calvinists, and only 68 Jews returned as labourers, while of the four faiths merchants or shopmen are given as Catholics 20, Lutherans 36, Calvinists 20, and 131 Jews. This occupation is also favourable to the Jew.

* Medical Press and Circular.

PRESENT-DAY AREA-CONDEMNATION UNDER THE HOUSING OF THE WORKING CLASSES ACT, 1890.*

By J. PRIESTLEY, B.A., M.D., D.P.H.,
Medical Officer of Health of Lambeth.

So that there may be no misunderstanding, allow me at the commencement of my paper to state that my own experience in Lambeth parish as medical officer of health would appear to show that area-condemnation under Part I. of the Housing Act can be but rarely needed, and, further, that considering the costliness and the dilatoriness of the legal procedure, the difficulties with the central authorities, and (last, but not least) the wholesale displacement of tenants without satisfactory (or even any) attempts at proper and suitable rehousing, a medical officer ought to consider carefully, so as not to commit his authority, unless absolutely necessary, to such a course of action. At least, such has been my experience in Lambeth parish, and considering that Lambeth is a fairly large (300,000 and over inhabitants) and representative district, there must be other medical officers who have had a somewhat similar experience. The object of my paper, then, must be clearly before you, and there must be no two opinions as to what I mean. Taking my Lambeth experience as a guide, it would appear that area-condemnation or representation (to use the legal phraseology) under Part I. of the Housing of the Working Classes Act, 1890, is more theoretically than practically advisable—at least, in the great majority of cases. Some of the difficulties I propose dealing with, and at the same time I venture to lay before the Society of Medical Officers of Health an alternative course of action, which I have personally found useful in my own district, and which has met with the *unanimous* approval of my authority.

I am free to admit that there are areas (*e.g.*, the Boundary Street area) that can only be dealt with under Part I. of the Act, but despite such admission I am of opinion that some areas that may be proposed to be condemned can be, with advantage to everyone concerned, better dealt with by my alternative method, which I propose calling "house-condemnation," and which depends upon house-to-house inspections of individual houses and buildings,

* Read before the Incorporated Society of Medical Officers of Health, March, 1900.

with the serving and enforcing of notices under the powers given under the Public Health Act and under Part II. of the Housing Act, the latter dealing with individual houses and small collections of houses—*e.g.*, courts and streets. I should be the last in the world to belittle in any way the work of my brother medical officers of health who have acted, or are acting, under Part I., but I do honestly think that there is another side to this question to be looked at, and that other side I propose to lay before you to-night.

First as to area-condemnation under Part I. The medical officer of health, on his own initiative, or on that of two or more justices of the peace, or of twelve or more ratepayers, makes in writing an official representation to his authority that a certain area within his district is dangerous or injurious to health, and that such unhealthy area can *only* (please note this small but important word) be remedied by an improvement scheme. This representation may or may not be supported by satisfactory statistics as to increased mortality or morbidity amongst the persons inhabiting such area.

This representation or condemnation made by the medical officer must then be agreed to (by resolution) by the sanitary authority (who must also be satisfied at the time as to the sufficiency of their resources for such a purpose), and an improvement scheme propounded, allowing such new dwelling accommodation for the working classes (who are to be displaced by the scheme) as is required by the Act. In London not less than half must be provided for; elsewhere, as many as the confirming authority may think fit. The scheme is then duly advertised, and the central authority (*e.g.*, the Secretary of State for London, and the Local Government Board for other urban districts) petitioned for an order confirming the scheme. Then follows a local inquiry, on the result of which the central authority, if satisfied as to the sufficiency of the scheme, may make a provisional order, to be afterwards confirmed by Parliament by means of a confirming Act. The provisional order may or may not modify the original scheme. After the confirming Act has been obtained, the real work begins—*viz.*, acquisition is to be made of the land and its condemned buildings; compensations to be agreed upon and settled, or, if not agreed upon, referred to an arbitrator; plans (in detail) to be prepared and submitted for approval to the central authority; and so on, and so on.

Allowing for the well-known—shall I call it caution or delay? that always takes place in connection with the central authority, the above steps are taken extremely slowly, and irritation results,

if all local enthusiasm for the scheme be not found to be at the same time ebbing slowly but surely away. Further, any alterations that may be found absolutely necessary as the work proceeds must be also submitted to the central authority for approval, with the result that further delay takes place, with more irritation, and may be with the complete disappearance or evaporation of what little local enthusiasm remained. The financial values of all these delays and all this red-tapeism must not be forgotten. Meanwhile, the medical officer who has started this expensive scheme has time to reflect as to whether or not it is worth it from a public health point of view, more especially when it is remembered that in the delay (which may be years) the area in question is practically neglected as far as the sanitary inspectors or inspectors of nuisances are concerned. The consequences are not far to seek. Dilapidated houses become more dilapidated, unhealthy conditions become more unhealthy, nuisances increase in numbers and become intensified, careless tenants become more careless, and the value of the district is considerably lowered by the sanitary slump. There is a general levelling down, and the continued neglect of houses makes confusion worse confounded.

Acknowledging, as I think we all must, the truth of the above picture, would it not be better, considering the present involved, costly, and generally unsatisfactory state of the law in connection with large area-condemnations, to spend the time and money in carefully inspecting (house to house) the different buildings comprising the area, and serving necessary notices, and having such notices rigorously carried out? Much good work can be accomplished in a period of a few years, especially with an energetic and sufficiently large inspectorial staff, which is properly supported by the sanitary authority. Such an alternative is, I admit, uphill work; but, at the same time, my own experience shows that such uphill work gives very satisfactory results. The financial saving no one will gainsay, whilst another important advantage I propose dealing with, more in detail, later on.

I think I am right in saying that few areas have yet been represented without it being admitted in evidence or cross-examination that only a percentage of the houses comprising such area are really *individually* totally unfit for human habitation, and in a condition sufficiently bad to warrant closure forthwith. The majority of the houses may be on the downward path, but not too far gone to be considerably improved by care and attention, whilst a few of the houses are, of course, in fair, if not good, condition.

I have already admitted that there are here and there odd areas

that cannot possibly be dealt with except under improvement schemes, with the rearrangement and widening of the streets, etc., so as to give better light and ventilation, but these are exceptions in my experience. Taking my own district, I can state without fear of contradiction that there is no area which can *only* be dealt with by means of a scheme under Part I. of the Act. It is true that there are some parts of my district near to the river (the so-called Inner Wards) that are not *ideally* all one could wish, but even these are yearly becoming better under the treatment of systematic house-to-house inspections, with the serving of notices (*a*) under the Public Health Act, 1891, and occasionally (*b*) under the Housing of the Working Classes Act, 1890, Part II. What is true of Lambeth must be true also, I think, of other districts—at least, speaking generally as to benefit to be derived from such a systematic house-to-house inspection.

There can be no two opinions as to which is the better course to pursue (if possible) in the present state of the law—*i.e.*, whether to adopt house- or area-condemnation. Let me give an example to show what I mean. My own district in part abuts on to another, where the area-condemnation treatment is in progress, and where the subsequent inspectorial neglect (such as I have mentioned in the first part of my paper) appears also to be in progress. The difference between the two adjoining districts (or, rather, let me say portions of the districts) is sufficiently marked to be admitted by all who care to visit and view for themselves. The districts, abutting as they do, are comparable as to sites, ages of houses, nature of tenants, arrangements of streets and courts, etc., whilst no one would say that the medical officer of the adjoining district is wanting in energy. How is the difference between the two portions of these adjoining districts brought about? I think that there is only one answer to this question, *viz.*, the different mode of attack (for just now we must use military phrases). In my own district, house-condemnation is the line of attack; in the adjoining district, area-condemnation is the manœuvre preferred. It may be, of course, that when the area-condemnation scheme of the neighbouring district is an accomplished fact, and the present old dilapidated houses gone (and tenants, too, for tenants disappear as well in such schemes), when their places have been taken by new, up-to-date buildings with large and wide streets, open spaces, flowering trees, playing fountains, and last, but not least, highly proper and respectable tenants, then I may be ashamed of my own adjoining parish. Such time has, however, not come as yet, nor will it, I am afraid, in my day—certainly not in South London, unless, perhaps, I am

to be blessed with much more than the allotted threescore years and ten, a span of life, by the way, which all medical officers so richly deserve! Meanwhile, what is happening? In the adjoining district, the houses individually and collectively are yearly and monthly becoming worse, as the result of inspectorial neglect; whilst in my house-condemnations they are improving *pro rata*, as the result of careful house-to-house inspections. Who is to say that the inhabitants also are not being affected the same, in the one case becoming more and more apathetic sanitarily and morally, and in the other case being at least improved by their better sanitary surroundings?

Before leaving this portion of my paper, I may be allowed to point out that a large portion of the so-called Inner Wards, or northern parts of the parish of Lambeth, belongs to the Duchy of Cornwall—an owner who is *outside* the pale of the Housing (or other) Acts. Consequently, I should not have been able to condemn wholesale, even had I thought such an action necessary, as any such condemnation would have been to a certainty opposed, and opposed successfully, by the Duchy. Instead of opposition, the Duchy has assisted me, and is still assisting me, in my house-condemnation method. Old, worn-out houses are one by one disappearing, and their places being taken by new, improved ones from time to time, as becomes necessary. The change is a gradual one, but none the less satisfactory, more especially as there is practically no displacement of tenants.

This question of displacement of tenants is really the *crux* of the housing question. A large scheme is entered upon, and hundreds and thousands of persons are displaced and left to look out for themselves. The Boundary Street area scheme displaced 5,719 persons, and where are they now? Certainly not in the Boundary Street area! What is the result? As tenants are displaced they move into neighbouring houses, which they consequently crowd and overcrowd, and so the sanitary authority itself creates by means of one Act of Parliament serious nuisances, which it then becomes the duty of the same or a neighbouring sanitary authority to abate by powers invested in them under another Act—viz., the Public Health Act. All experience shows that, as a rule, where an area is cleared on account of its so-called slumminess, neighbouring properties, which might be previously (considering all things) passable, are apt to become—nay, do become—rookeries, requiring in their turn to be dealt with. Further, it is common knowledge that amongst the persons displaced there are those who must live in that immediate neighbourhood, so as to be near to their work, which is of

a casual or irregular kind, or for other equally cogent reasons. They necessarily tend to still more crowd and overcrowd, and so perpetuate all the evils (sanitary and moral) attendant thereon. As the result, houses become scarce, rents increase, and subletting of rooms follows as a natural course.

In this way the difficulty is not overcome, but simply transferred from one district to another, and from one house to another, and so the continuity of the vicious circle is ensured. In other words, *insanitary areas* may be in this way manufactured by *sanitary authorities*. As proof of the overcrowding, I have only to recall to your minds the Registrar-General's important and well-known censal returns, which relate to tenements and to the numbers of persons inhabiting the same. Can it be wondered at, then, that public bodies (even the London County Council) are beginning to pause and consider carefully the pros and cons before entering upon large area-condemnation schemes? They are suggesting (and rightly so) the necessity for the provision in the condemned area itself of sufficient and suitable accommodation for the tenants who are to be displaced *before they are displaced*—a most important suggestion, and one that is fortunately now being more and more insisted upon by all Government departments.

Hitherto, the practice has been to condemn an area, displace the tenants, and then consider as to where such displaced tenants are to go, with the very natural result that the consequences are not satisfactory to the promoters of the scheme, and certainly not to the displaced tenants! Again, when an area is condemned, one of the reasons given is that the area and its houses are overcrowded; and yet, strange to relate, the central authority steps in and by section 11 of the Housing Act compels (or may compel) sanitary authorities to rehouse practically the whole of the tenants (to be displaced by the scheme) upon the same area. If not the same tenants, at least an equal number of tenants drawn from other and often less-crowded districts—a truly novel way of preventing area overcrowding! It is a very serious fact (and fact it is) that the new dwellings provided on a cleared area are quickly seized upon by people in other districts, and that it is a *very rare* exception to hear of displaced tenants going into the new sanitary dwellings provided for them. The reason of this is not far to seek. The newly-erected dwellings have to be built on land that is bought at an exorbitant price, have to be built in conformity with the present-day strict bye-laws and stricter (somewhat theoretical if not unreasonable) conditions insisted upon by the central authority, with materials at a very much increased cost, and, in addition, by

workmen who demand (and get) nowadays higher wages and shorter working hours. Such dwellings, when completed, cannot, therefore, be let at the rents that the displaced tenants have been paying, or even can pay, and consequently the better-class artisans step in and drive the *bond-fide* labouring classes out. What I am saying is a hard—yea, a cruel—fact.

The skilled artisan class is in a position to look after itself, and can be, and ought to be, catered for by private enterprise. They can even afford to go farther afield and take advantage of cheap railways and trams, which are being so much boomed at the present day, thereby assisting in relieving somewhat, but I think very little, the central congestion. Not so, however, the *bond-fide* labouring classes, especially those in casual or irregular employment, who must be on the spot near to their work, and who cannot afford to pay the increased rents asked for in connection with the new, modern, up-to-date dwellings. What is to be done with them in an area-condemnation? Surely a sanitary authority which really has the question of the working classes at heart is not honestly doing its duty if it fails to insist that any new dwellings provided must be provided *before the old ones are closed and demolished*. Further, such dwellings must be *within the condemned area*, or in its immediate neighbourhood, and let at such rentals as can be paid by the displaced tenants, who in all cases must have the first refusal; nay, I would go further, and say ought to be *induced* to take them. This, you will say, is a large order. So it is; but the housing of the displaced working classes is a large question, calling, if necessary, for relief out of the rates, so as to enable the new buildings to be let at the same rents as the old ones. All are agreed that the new accommodation must be sufficient and suitable, and the question arises, How is this to be done? It will not meet the case to simply build large models, for into such the displaced tenants—at least, the majority—will not go, preferring as they do the privacy and independence either of a self-contained cottage or house (if necessary, with the addition of lodgers), or even of a flat or tenement. Liverpool is said to be able to build such dwellings in three to five storied tenements (each tenement being self-contained, and having one, two, three, or four rooms), and to let them at about 1s. 5d. per room, and that, too, at a profit of 2½ to 4½ per cent. net, *i.e.*, after deducting all losses from bad tenants, repairs, rates and taxes, etc. The money is raised by loan. A caretaker is provided by the Corporation, and is what his name implies, *viz.*, a man to take care of the tenements as well as of the people inhabiting them. The land costs 12s. per square yard. This

experiment of Mr. Boulnois has resulted in self-contained, cheap, sanitary, and cheerful houses at reasonable rentals being supplied in Liverpool, and taking the place of the old insanitary, dirty, dilapidated houses in courts and alleys. Liverpool is proceeding on the right lines: a comparatively few houses (400 to 500) per year, with a minimum displacement, and the displaced tenants to have the first refusals of the new rooms, which are let at such reasonable rentals as *under 1s. 6d. per room*. Liverpool is to be congratulated, as far as appears from the above details, which are taken from the special report on "Artisans and Labourers' Dwellings," issued by the Liverpool Corporation, and which I have before me now.

Manchester, too, is providing different kinds of accommodation, as follows:

- (a) Five-storied tenements, with common stairs and balconies.
- (b) Blocks of tenements of two or three stories, with separate entrances and separate stairs to each set of tenements.
- (c) Terrace cottages of five rooms each.
- (d) Model lodging-houses.

Displaced tenants have rights of refusal, whilst the schemes carried out are comparatively small per annum. The money is borrowed at 2½ to 3¼ per cent., repayable in forty to fifty years. Back-to-back houses are being steadily replaced by through houses both at Liverpool and Manchester.

Other districts are, of course, doing good work; but I have simply mentioned Liverpool and Manchester as they carry out their schemes under local Acts, Liverpool being the pioneer in reforming and bettering the dwelling-houses of the working classes by legislative measures. Further, such schemes appear to be practicable and financially fairly satisfactory—a very important consideration.

Let us now take, as an example, the work being done by the London County Council for the working classes of London.

Mr. Blashill, the late Superintendent Architect of the London County Council, has worked out the cost at £45 or £50 per person displaced by such an area-condemnation as, *e.g.*, the Boundary Street, whilst it appears to be quite the exception for displaced tenants to be rehoused in the new dwellings that have been provided. Tenants have even come from Battersea (a comparatively suburban district) to take these Bethnal Green houses! Mr. Blashill, as the result of his experiences, speaks of area-condemnation under Part I. of the Housing Act as costly, dilatory, and unsatis-

factory as to re-housing—an opinion with which I personally entirely agree; and I am glad of this opportunity of saying so, remembering Mr. Blashill's wide and exceptional experience in connection with the Housing Question in London, both with the London County Council and with the Metropolitan Board of Works.

With such an opinion before us, whether we regard this Boundary Street scheme *financially*—i.e., as to total cost, £603,000, or as to rents charged, 3s. per room—or *practically*—i.e., as to the displacing of the tenants, and re-housing of the tenants who are so displaced—it would appear that the London County Council has not been as successful as could be wished, and this being so, the question arises as to how these financial and practical difficulties are to be met. Some may think that a sanitary authority is justified in using the municipal purse for the purpose of enabling it to build suitable dwellings for the working classes to be let at reasonable rents. Others say that we ought first to try and encourage private enterprise by arranging (by the intervention of the Legislature, if necessary) for money to be lent to builders and others at very low rates of interest by public bodies, and repayable after much longer periods than have been hitherto allowed, with postponement of the operation of the sinking fund until *five* years after the houses have been built—important considerations, as shown by the facts that the difference between a thirty and fifty years' loan is 6d. per week on the rent for every £100 worth of capital outlay. The advantage of a maximum 2½ per cent. as suggested over what is now charged needs no commentary, whilst the five years' delay in starting the sinking fund explains itself.

A further suggestion is that a public body might purchase land, and then lease it to private owners for working-class dwellings to be erected on it, also lending the money at 2½ per cent. (or less) for a period (say) of ninety-nine years—the buildings to revert to the public body at the end of the time, and also the land, which will have meanwhile much increased in value. The buildings to be erected must be centrally placed (i.e., near to the tenants' work-places), and must be suitable; and if to enable this to be done a dip has to be made into the ratepayers' purse, it must be made. A slight financial loss is justified if by such loss the important question as to the proper sanitary housing of the working classes is solved, even in part.

Lastly, there is the suggested policy of obtaining new Parliamentary powers for enabling sanitary authorities to buy land *outside* their own districts, and building dwellings thereon for the working classes, with cheap trams and railways. Whilst the skilled

artisans (and others) may take advantage of such country (or suburban) dwellings, and may be able to meet the charges of rent *plus* daily travelling expenses, there are many of the *bonâ-fide* labouring classes who cannot avail themselves of such opportunities, owing to the fact that they must be near to their work, either from compulsion or from preference. Indeed, as far as the general question is concerned, the artisan class may be left to look after themselves; it is a matter with which the municipalities need not interfere. Further, slight relief to the central congestion from the spreading out excentrically of the artisans is a negligible quantity practically, as extensions of business places with consequent displacement of tenants more than balance any such relief. Indeed, the classes who chiefly in an area-condemnation demand the attention (and help) of a sanitary authority are the *bonâ-fide* labourers, and the accommodation required is, in my opinion, such as I have outlined. There are, in addition, the very poor—the so-called submerged tenth or outcasts of society—also to be catered for, and for such, model common lodging-houses (male and female) are needed—e.g., such as Glasgow and other towns are successfully providing. Decentralization and cheap locomotion do not settle, by any means, the housing question.

It will be noted that I have left out such side-issues as rating unoccupied houses and site values, or even the taxation of ground-values, such questions (though interesting) hardly affecting the main issue.

These, then, are some of the difficulties and annoyances to be met with in area-condemnations, and with such an experience before our eyes are we, as medical officers, justified in embarking our authorities unnecessarily on such a stormy and treacherous sea? Is it not better to push house-condemnation, and endeavour by careful and constant house-to-house inspections of individual houses to have them kept up to as good a sanitary level as possible, and so prevent insanitary areas from growing up, and the real distress that arises from wholesale displacements of tenants? The insanitary areas of to-day have become so owing to persistent neglect in the past—neglect on the part of the owners, in not keeping their properties in a sanitary and proper condition, and neglect on the part of the sanitary authorities, in not looking after the owners better and seeing that they met their legal liabilities in regard to their properties, both when building and since. Mistakes in the past do not warrant mistakes in the future, and there is a very serious responsibility resting with those sanitary authorities (and their officers) who do not, for the future, do their duty better than they

have done in the past in looking after not only existing houses but also those in process of erection.

I sometimes think that so much attention has been paid to area-condemnation under Part I. of the Act, that perhaps it has been overlooked that Part II. gives powers to a medical officer to condemn separate houses or small collections of houses forming courts and streets, and have them (1) put into proper order and condition, or (2) closed, and afterwards (3) demolished, if necessary.

The Public Health Acts, too, give powers to have houses kept in proper order and condition, or closed, and a systematic house-to-house inspection, therefore, of the existing dwellings of the working classes can do much to improve them and to keep them in a sanitary state. Constantly improving individual houses, and keeping them well up to a good sanitary condition, may prevent the necessity of formulating a large and expensive improvement scheme, whilst the displacement of tenants is practically nil. Registration of houses let in lodgings must not be forgotten in this connection.

By such action the owners themselves are made to bear the expense connected with the improving of their properties, and the common purse of the ratepayers has not to be dipped into. Surely such a procedure is more equitable, and more in accordance with present-day advancement in sanitary matters. As education advances, the standard of sanitation is raised, and tenants expect better houses; and landlords must move also with the time and provide such, or in these days of competition those who do not advance will naturally (to use an Irishism) be left behind. A useful spurt can be easily given by the officers of a sanitary authority, when necessary, to lagging owners, whether leaseholders or freeholders.

A strict and constant supervision in the poorer and more congested parts of a district, ensuring the houses being kept up to a fair sanitary standard, is proving satisfactory in Lambeth as far as the houses are concerned, and also as far as the tenants are concerned: for experience shows that in sanitary matters, as in other matters, people are dependent upon their surroundings. Where houses are dilapidated and insanitary, the tenants show a tendency to become morally and physically the same, and *vice versa*; indeed, the apathy of tenants is remarkable, rendering frequent inspections of houses by the officers of a sanitary authority a *sine qua non*. Large amounts of money have to be spent by owners on their properties; insanitary areas are prevented; and no premium is offered for slum property, as is apt to be the case where a sanitary authority compulsorily purchases such property with a view to clearing an area under Part I. The lower grades of the working classes require well and

constantly looking after, and the Medical Officer of Health of Birkenhead was not far out when he suggested, in one of his papers read before the Sanitary Institute Congress, that the submerged tenth should be a "scheduled class" under inspection of the sanitary authority, and bound down by strict bye-laws to keep themselves and their abodes at least semi-respectable. In this connection Part III. of the Housing Act must, in passing, be borne in mind—powers by which a sanitary authority may, after adopting by resolution this part of the Act, compulsorily or otherwise (1) acquire land for the erection thereon of lodging-houses or cottages for the working classes, or (2) purchase and convert existing buildings into dwellings for the labouring classes, and (3) make any necessary bye-laws and regulations in connection with such dwellings.

For ordinary house-condemnations, the Public Health Acts give all the powers necessary; but in "extreme" cases Part II. of the Housing of the Working Classes Act, 1890, enables sanitary authorities to deal satisfactorily with insanitary property, the "owners," who under this particular Act are generally freeholders or leaseholders, having not less than twenty-one years' interest, preferring to have their condemned premises put into proper order and condition rather than closed; at least, such is the Lambeth experience.

I need hardly remind a body of medical officers that the "extreme" cases, in which the Housing Act may be put into force, are as follow:

1. Want of proper site, light, or ventilation.
2. General dilapidation and want of repair (from age or otherwise).
3. Defective construction of houses, either as built originally or as developed since.
4. The existence of serious sanitary nuisances, arising from defective drains, dampness, etc.
5. The close proximity of obstructive buildings.
6. The fact that short-termed leaseholders or owners are sometimes financially unable, or *unwilling*, to spend sufficient money on their properties, etc.

In Lambeth, whereas an annual average of about 7,000 notices under the Public Health Act has been required, only forty notices were needed as a yearly average under the Housing Act, and in few cases have the houses been closed.

One more word as to displacement.

In connection with railway extensions, improvement schemes, increase of business premises (factories, workshops, etc.), there is

a certain amount of what I will call *unavoidable displacement*. Areas (large and small) are from time to time voluntarily or compulsorily absorbed—slowly, but none the less surely; houses are closed and demolished, with the natural result that the tenants are displaced, and subsequently overcrowd the houses in the immediate neighbourhoods. In these cases a sanitary authority is practically helpless; the displacements must be regarded as necessary evils. All that a sanitary authority can do is to insist that a *pro rata* amount of accommodation be provided *before any displacement of persons is allowed to take place*; and, further, that such accommodation be suitable, *e.g.*, as to rooms offered, rents asked, locality, etc.—matters with which I have already dealt. The Lambeth Vestry has had to fight hard, but has been successful, and now makes, in all cases, stringent conditions as to re-housing. Thus, at the last meeting of the Vestry, the following conditions were agreed to be asked for as a *sine quid non*, even in connection with a small area of two streets, which are to be acquired by a private syndicate:

"1. That the whole of the families displaced shall be provided for *before demolition of the present buildings, and before displacement*.

"2. That the rent to be charged in the tenements to be erected for the re-housing of the people displaced shall not exceed 2s. per room.

"3. That the site to be chosen for the erection of these re-housing dwellings shall not be at a greater distance than half a mile from the site in question."

Dealing thus strictly with a private owner, I need not say how particular my Vestry is with a public company such as the London and South Western Railway, which will have good reason to remember the big, and as far as Lambeth was concerned, most successful fight fought before Select Committees of Parliament.

In the central parts of London, and the same applies (more or less) to all prosperous towns, this *unavoidable displacement*, as I have called it, must take place, and will prove sufficiently serious to require all the energy of the sanitary authorities in seeing that proper provision is made for re-housing as many of the displaced tenants as possible (if not all) in the immediate neighbourhood. Why, therefore, increase the labours of sanitary authorities by advising in addition large area-condemnation schemes, which must of necessity greatly intensify the re-housing question and lead to trouble which in my opinion is quite unwarranted, except in certain exceptional instances as already stated?

House-condemnation gives satisfactory results if systematically carried out, and there is, in addition, practically no displacement.

The tenants of a house may be temporarily inconvenienced, but the Lambeth experience goes to show that though a few owners may, in odd cases, raise the rents to recoup themselves for extra capital outlaid through notices served by the sanitary authority, such is the exception, and rarely (if ever) leads to the tenants having to leave on account of the rents being so raised. This is a very different experience from that met with in connection with area-condemnations, where the displacement may be wholesale.

I may add that the question as to the expediency of removing manufactories and works into the suburbs or into the country, and so of relieving central congestion by the enforced withdrawal of the workpeople, is one that may have to play an important part in the future, and with the future I will willingly leave it.

In conclusion, weighing all the pros and cons, I feel I am justified in describing area-condemnations as not working out at all satisfactorily in practice. Such area-condemnations might, therefore, with advantage for the present, pending at least improved legislation for the working classes, be laid aside, and their places taken by careful house-to-house inspections of existing premises, and keeping such up to as high a standard of sanitary excellence as possible. Exceptional cases may have to be dealt with by means of Part I.

DISCUSSION.

Dr. ALLAN said the introduction into Parliament of a measure to amend the Housing of the Working Classes Acts and the opening by H.R.H. the Prince of Wales of the Boundary Street Estate, combined to make the present moment a very appropriate one to raise the question as to how far the Housing of the Working Classes Act had been a success, and in what respects it had been a failure. Dr. Priestley appeared to have decided that Part I. of this Act, with rare exception, was a failure, and any action taken under it was therefore unjustifiable. But he (Dr. Allan) was sure that if Dr. Priestley found in his district an area which could not be dealt with except under Part I., he would not flinch from making the necessary representation, even though, as Mr. Blashill had so well put it, the procedure were "costly, dilatory, and unsatisfactory as to re-housing." In the particular circumstances with which Dr. Priestley had to deal in Lambeth, the course of action he was pursuing was undoubtedly the right one, and he was perhaps fortunate in finding he could work on those lines; but it was a mistake on his part to imagine that the same conditions obtained everywhere. Even to carry out what might be called the repairing process was not free from difficulties and tedious delays, and most medical officers of health, sooner or later, discovered the obstructive owner, who tried to persuade the magistrate that he had complied with all the requirements to make his house habitable when he had done a little limewashing and repaired a window-sill or two. Much, undoubtedly, could be done by obtaining a strict observance of statutory orders, by removing obstructive dwellings, by widening and opening up streets (under Part II. of this Act, or under Michael Angelo Taylor's Act); but there were parts of our older cities where much more than this must be done, where more

drastic measures must be undertaken. It might not be on the ground that the majority of the houses themselves were individually decayed, but because, as the Act put it, of the narrowness, closeness, and bad arrangement of the streets, or the want of light, air, and ventilation, "which cannot be effectually remedied otherwise." The principles of action which Dr. Priestley had enunciated, excellent as they were for application in suitable cases, were totally inapplicable when areas had to be dealt with such as the Boundary Street area, the Clare Market area, the Closes of the Old Town of Edinburgh, or parts of Liverpool and Glasgow. In such cases satisfactory action could only be taken under Part I. of this Act, or a special Act must be obtained for the purpose. If there were difficulties in the way, were they to shirk their duty because, as Dr. Priestley said, it might "embark their authorities on a stormy and treacherous sea"? What sea was not stormy? The Dead Sea was perhaps an exception, and surely Dr. Priestley was not going to take its stagnation as typical of sanitary authorities. Adopting the words recently uttered by H.R.H. the Prince of Wales, he (Dr. Allan) would say: "One thing is certain, the difficulties have to be surmounted. I am satisfied not only that the public conscience is awakened on the subject, but that the public demands, and will demand, vigorous action in cleansing the slums which disgrace our civilization." Dr. Allan thought it would be conceded that a mistake had been made at first in relying upon Part I. of the Act solely for power to re-house. In his opinion the proper way to regard it was as a means for clearing an area, while Part III. should be utilized for providing housing accommodation in advance. He was glad to see that the London County Council was now coming round to that view. Some of the persons in any given area required to be housed in the immediate vicinity, and he quite agreed with Dr. Priestley that such dwellings should be let at such rentals as could be paid by the tenants about to be displaced, who should in all cases have the first refusal. One great difficulty in such schemes was the cost, and it was eminently desirable that some steps should be taken to reduce it. The question was one which must be dealt with some day, but it did not necessarily arise on this paper. It was evident that if only such houses were erected on or in the vicinity of the cleared area as were absolutely necessary to re-house those who must live there, then the land, which was often in central situations, could be much more profitably dealt with. To do this, however, advantage must be taken of Part III. of the Act to acquire land for the erection of dwellings in districts where rents were reasonable, and to which easy, rapid, and cheap transit was possible. On the question of land tenure and leasehold interests, he would only quote the conclusion of the Royal Commission on the Housing of the Working Classes contained in their supplementary report, that "the prevailing system of building leases is conducive to bad building, to deterioration of property towards the close of the lease, and to a want of interest on the part of the occupier in the house he inhabits," and that "the system of building on leasehold land is a great cause of the many evils connected with overcrowding, unsanitary buildings, and excessive rents." In conclusion, he would only add that they required much greater stringency in the requirements of the Building Acts. It was ridiculous that they had such little power of control in regard to buildings which were in course of erection. It also seemed a matter of moment that a house suitable for occupation by one family should be allowed to be converted into a tenement house without alterations being carried out to make it fit for such use.

Dr. CHALMERS expressed his pleasure at being present at that meeting, and considered himself as specially fortunate in hearing the very able paper which

Dr. Priestley had just read. There were several aspects of the subject which had been presented in quite a new light, but most notably the value which Dr. Priestley appeared to attach to Part II. of the Act as a method of improving house accommodation on a large scale. In Glasgow they did not take action regarding individual houses, or small collections of houses, under this part of the Act, because they had somewhat similar power under a local Act, which was simpler in its working. Moreover, under Part I. they had taken no action in Glasgow, because they possessed two Improvement Acts, one of which was obtained in 1866, and the other in 1897. These Acts dealt with certain insanitary areas, and one reason which prompted them in Glasgow to adopt this course was that it shortened legislative procedure. Dr. Priestley, in describing the operations under Part I., had characterized them as "frontal attacks," and he (Dr. Chalmers) thought that Dr. Priestley might have suitably applied to the operations under Part II. another term also borrowed from current newspaper phraseology. The powers of Part II. were only in a limited sense applicable to the purposes of improving houses. They supplied a means, however, of selective condemnation—of "sniping," as it were, the individual house which was structurally uninhabitable, and shutting it up; but this did not in the first place render other houses more habitable, or in any way increase the amenity of the neighbourhood. It might so happen that in a given "land," or court, the displacement of even one-half of the tenants could be accomplished without in any sense improving the houses of the remaining half. Dr. Priestley, if he (Dr. Chalmers) understood him aright, was somewhat apprehensive that the repopulation of reconstructed slum-areas would be accompanied by reappearance of some of the features which were characteristic of the displaced population. As proof that this apprehension was unfounded, Dr. Chalmers cited the example of a district which formerly had been one of the most notable slums in Glasgow, but which had to a very large extent been completely razed, and thereafter rebuilt and repopulated by inhabitants of an entirely different class, with the result that the death-rate had fallen from an average of 42 per 1,000 in the decade 1881-91, to 32 per 1,000 in the recent years of the present decade. According to experience of Glasgow, in none of the areas to which the dispersed population migrated were the conditions prevalent in the depopulated area quite reproduced, or even imitated to an extent suggestive of a rapid approach to those conditions, while the death-rates of these invaded areas had only shown a moderate increase. He was glad to see that under the Bill for the Amendment of the Housing of the Working Classes Act now before Parliament it was proposed to give authorities power to acquire land beyond their boundaries.

Mr. BLASHILL said this was of course largely a medical question, and he knew nothing about that aspect of it. The paper which he read at the Sanitary Congress at Southampton was written entirely from the architect's point of view. He had come to the conclusion, after many years' experience, that area-condemnation as carried out necessarily under this Act was a great mistake. Whether area-condemnation should be continued at all he was not prepared at present to say; but he could not agree altogether with Dr. Priestley. Some areas could probably be dealt with in no other way. If a row of houses had no ventilation, proper ventilation could not be obtained by dealing with a house here and there. Area-condemnation was so costly under the process prescribed by the Act of 1890 that only a very few special cases should be taken. The cost worked out at about £50 per individual displaced, which was an initial loss. If the owner were responsible for the cost of remedying the unsanitary condition of the area,

more attention could then be paid to the people who were turned out. The notion that a man must necessarily live near his work was something new, and one he did not accept. It might be true in a few cases, but the County Council found that only 20 per cent. of the residents in the Clare Market area required to live near their old homes. It might be a convenience, but personally he did not believe even in the 20 per cent.—as a matter of necessity. By abandoning rehousing an economy of £50 per head could be effected. If the displaced inhabitants had to remove to such a distance that their expenses would be increased, compensation should be given, not in money, but in the form of a guarantee of the rent or some part of it for three, five, or seven years. That would deal with the housing question, and would not cost a quarter of £50 per head. He questioned whether displaced inhabitants should be re-housed in the highest standard of accommodation at the public expense. He thought that a Society such as that of Medical Officers of Health should come to some clear conclusion as to what conditions would render a house unfit for habitation.

Mr. MURPHY said it appeared to be necessary to refer to the circumstances which made improvement schemes necessary. They were necessary where the sites of the houses were faulty and rearrangement was required. If the land was in one ownership, they might look to such owner to carry out the necessary improvements when the leases fell in, but when the land was in a number of ownerships that could not be hoped for. If only repairs had been effected, they would now have had many acres of land crowded with streets of a most insanitary kind, and containing houses which no human being ought to live in. For instance, in St. Giles's District area after area had been cleared of courts and alleys, and narrow streets crowded with houses with insufficient air-space, for which no possible improvement of the houses would have sufficed. The only thing was to clear away the whole, and rearrange the streets. But for such representations, made in face of great opposition, the sanitary condition of St. Giles's District would not be in its present satisfactory position. He (Mr. Murphy) was not satisfied with the name of the Act under which these schemes were carried out. The Housing of the Working Classes Act was really a Nuisance Removal Act, framed on a large scale—at all events, so far as Part I. was concerned. They cleared away insanitary property, and made the best use they could of the land. Parliament very properly required that due regard should be paid to the people displaced, but the main intention was to get rid of unhealthy areas. It was certainly an expensive Act; it did not always work well, and many of them would like to see it amended in one way or another. If, for instance, the cost of working the Act could fall on the owners, it would be a matter for satisfaction to the ratepayers. Questions of this sort were for Parliament; but inasmuch as these areas were dangers to the community, the community was justified in spending money to get rid of them. Another point they had to consider was how these conditions came into existence. It was largely through faulty Building Acts, or perhaps want of such Acts. Some of the property in the Clare Market area in the Strand District was probably built in the time of Charles II. There were no Building Acts at that date, or if there were they were very insufficient. These conditions had been brought about owing to want of control and supervision, and from that point of view there was some justification in spending public money in finding a remedy. Apart, however, from the ethics of the question, it was the duty of medical officers of health to endeavour to free their districts of these slums.

Dr. SYKES admired Dr. Priestley for his courage in coming there and so

frankly telling them his opinions on this question. He congratulated him in being able to carry out Part II. of the Act, but that did not justify him in saying what he had said of Part I. Personally, there appeared to him more difficulty in administering Part II. of the Act than Part I. He rather felt that Dr. Priestley was on the wrong line in one direction, in his comparison of London with other places. He was sure Dr. Chalmers and other provincial officers would forgive him if he said that London was altogether exceptional. For instance, Dr. Priestley had said that in Liverpool the land had cost 12s. per square yard. Dr. Mansfield Robinson had told him (Dr. Sykes) that in Shore-ditch £4 10s. per square yard had been paid. That was a very great and serious difference. Dr. Priestley spoke about cottages. They might perhaps build cottages down at the Crystal Palace, but it was impossible to do so in Central London. Such cottages would soon be shut in by lofty buildings, and if the cottages were then inspected twenty times a day they could not be improved. Dr. Priestley objected to Part I. because it was so expensive. They admitted that all public work was expensive, but it might be simplified and economized. One of the difficulties under schemes was the question of re-housing. On the condemned area the houses were packed to the limit of 300 cubic feet per person; but when re-housed 600 cubic feet had to be provided—in effect doubling the number of persons to be accommodated. This could be remedied by requiring the authority to provide the same amount of cubic dwelling-space as had been condemned. Dr. Priestley suggested a complete house-to-house inspection. That would be an enormous work, entailing a very large staff. He could not accept Mr. Shirley Murphy's statement, that if public authorities did not take action in the matter the insanitary conditions would in all probability remedy themselves in time. If insanitary areas were dealt with by the owners, there would probably be no re-housing at all, because they would ultimately convert the dwelling-houses into offices, factories, workshops, and store-places. The displaced population would be forced still further outward, and the conditions centrally would get worse instead of better. Where private owners rebuilt dwelling-houses, accommodation of a very different, and usually better, class was provided. He knew of streets where single-room tenements could formerly be had at 2s. to 3s. per week which were now sites of residential flats, rented at £50 to £70 a year and more. In one street there were on one side ordinary "made down" houses, while on the other side such houses had been replaced by flats, so that there were two populations in the same street of totally different characters. The poorer people had not been displaced or re-housed by any public authority, but by private enterprise, and those who could pay most had been provided for best.

Dr. HEMBROUGH asked whether Dr. Priestley's methods could apply to certain old walled-in towns, where the approach to a row of houses was up a narrow covered passage, with cowsheds and stables adjoining. The only way for the animals to get in and out was through the same covered way. In some cases the only approach to the cowshed was through the passage of the house itself, and all manure had to be brought through the house. The houses were without through ventilation, and their construction was bad, to say nothing of defective ash-pits and other sanitary defects.

Mr. WIGHTMAN, J.P., said he had ventured there at the request of Dr. Priestley, to endorse what he had said with regard to the condition of Lambeth, and to the way they had tried to improve its sanitary condition. He knew that if they had such conditions as he once knew existed in St. Giles, they would have had to take different steps; but they had been fairly free from localities of that

kind; even their narrowest streets were not altogether without a fair amount of light and air. In their district Dr. Priestley's plan of dealing with these houses not only commended itself to the Vestry, but it also commended itself to the people who had to live in them. He represented those who had to meet these people, to advance these schemes in the presence of those who were going to be removed, without any compensation, with probable loss of work, and probably what was worse to them—loss of association. If they regarded an area purely from the sanitary point of view, they could get rid of the people (and one gentleman said he was glad to know they did not come back again); but however good that might be from a scientific point of view, there ought also to be considered the humanitarian side. He looked at this matter and these people, knowing their circumstances, knowing what removal spelled to them, and he said that some risk ought to be taken before they were dishoused, even if that risk resulted in the lowering by a decimal or two the standard of sanitation. Where a general clearance was about to take place, he would make it a *sine qua non* that accommodation for re-housing the displaced people should be provided in the neighbourhood. He was glad to say that this principle had been conceded by the London and South-Western Railway Company. Only last night it was reported to them that full accommodation would be provided for the people dishoused owing to the alterations at Waterloo Station. He had a great deal of sympathy with what Mr. Blashill had said. They must not go away with the idea that they in Lambeth were opposed to all clearances if they were necessary, but they entirely disagreed with gentlemen who said these people could go somewhere, anywhere out of their district. They thought even the poorest had a right to live, and if their houses were taken away proper accommodation should be found for them in the same neighbourhood.

Mr. FLEMING said it was very difficult to confine one's self to the scientific aspect of this important question. The human aspect had necessarily to be considered, and from this point of view he felt great sympathy with the views expressed by the Chairman of the Lambeth Vestry. The Housing Question at the bottom was a financial question. He was not familiar in detail with the parish of Lambeth, but the two cases quoted presented features of interest. The London and South-Western Railway were going to provide houses for the displaced persons at rents to be fixed by the Home Secretary, but it should not be forgotten railway companies regarded this compulsory re-housing at less than market rents as a serious tax on the cost of the widening of the railway lines, and they became consequently less willing to propose widening schemes. He was interested in the case quoted in the paper, to the effect that the Vestry had recently compelled a syndicate to fix the rent of dwellings they were erecting at a maximum of 2s. per room. He would like to know under what Act that maximum had been enforced, and what were the circumstances connected with it. It was clear that if the railway company could not provide accommodation at 2s. 6d. per room without loss, this syndicate would be at even greater loss. There was a popular impression that rent was dependent upon cost, but this was a fallacy. Rent was determined principally by demand, and not by cost. Take, for instance, the Boundary scheme, the cost of which Dr. Priestley said was lavish. The cost per room would be found to be within a pound or two of the cost of the Peabody Buildings. Yet the average rent per room was 3s. in one case and 2s. 3½d. in the other, although the cost was practically identical. If they took the cost per foot cube, they would find the Boundary Street buildings had been built at a cost less than the recent Guinness Buildings, which were

designed on very economical lines. With regard to the question of re-housing the actual persons displaced, an interesting sidelight on the question arose in connection with Columbia Buildings, a block erected by the Guinness trustees close to the Boundary Street area. These buildings were distinctly below the average of the ordinary Guinness Buildings. Moreover, they were built just at the moment the people were being displaced from Boundary Street. A large number of the displaced families moved into these Columbia Buildings, but at the end of six months hardly any of them remained there. They could not stand the discipline necessarily enforced by the trustees. But while the people had gone, the buildings remained, and would have to remain for many years yet. Thus, to secure a doubtful temporary advantage, a far more serious permanent disadvantage resulted. As to comparison with Liverpool, he was in conflict with Dr. Priestley, because he told them the Liverpool buildings paid very well, while the London buildings did not. He had apparently been furnished with incomplete data. At Liverpool, as a matter of fact, the buildings were subsidized from rates, while the buildings built by London voluntarily had paid their way. Dr. Sykes had told them the price of land was less in Liverpool; this was an important point to bear in mind. There were many other differences to be considered. Wages were less in Liverpool, and bricks and other materials were far less costly. If Dr. Priestley would favour him with a call some day, he would show him exactly how the difference between the 3s. and the 1s. 4d. was made up, and he could attack the items in detail if he so desired. The action of the medical officer of health in this question of Part I. condemnation appeared to him rather that of the surgeon when he brought the knife to bear on a patient. They only took this action when there was no other remedy; they only asked the ratepayer to bear this cost when there could be no other help. It was obviously a very costly procedure, and should not be employed more than was absolutely necessary to save human life.

Dr. H. BEALE COLLINS said he understood that the people displaced by the Waterloo improvement were to be re-housed within a mile, but the London and South-Western Railway Company had acquired fifteen acres of land near his district apparently for the purpose of re-housing some of the persons they were to displace by the extension of their railway.

The PRESIDENT said this paper had given rise to a most interesting and valuable discussion. Dr. Priestley's paper, in conjunction with Mr. Wightman's remarks, probably more nearly represented the facts as to Lambeth than either alone. He was prepared to think that, with some exceptions, Part II. of the Act might meet all the requirements of the district; the mistake was in assuming that the conditions were the same everywhere. Dr. Priestley had assumed that repairs would accomplish all that was necessary in every case. Indeed, he hardly mentioned a single case under Part II. which was not capable of being dealt with by repair, and had not taken into consideration cases under Part II. which required demolition. That was a very incomplete view of the Housing of the Working Classes Act. Mr. Blashill wanted them to come to a conclusion as to what was meant by unfitness for human habitation, but they had no hesitation on that question. It was, moreover, defined in the Act itself; and the mere putting of houses described in Section 4 of the Housing of the Working Classes Act into repair would not meet the requirements of the case. With Mr. Wightman's remarks on the humanitarian aspect they all heartily sympathized, and if Mr. Wightman went away with the impression that medical officers of health were not more anxious on this subject than anyone else, he

would be making a great mistake. At the same time, they were doing a great deal of good by clearing these areas. Persons of this class needed to be scattered and distributed among other strata of society. The supply of areas needing condemnation under Part I. was limited, and if these people went out of such badly constructed and badly placed houses into better houses, which such tenants would speedily cause to become out of repair, they could be dealt with as Dr. Priestley suggested.

Dr. BOND said they had heard much about the great expense of working Part I. of the Act, but no one had mentioned the saving of public money that was effected as a consequence of the improvement in the areas. They knew that a great majority of the residents in these insanitary areas, when ill, went to workhouses or hospitals. The insanitary area was conducive to illness, and the expense to the district therefrom was often lost sight of.

Dr. PRIESTLEY, in reply, said that after very careful consideration he had come to the conclusion that they had no area in Lambeth that required condemnation under Part I. of the Act. They had no area which could *only* be remedied by means of an improvement scheme. That being so, the simplest method was to proceed under Part II. He experienced no difficulty in dealing with different owners. It was often the freeholder who was the "owner" under the Act, and frequently the same freeholder for a number of houses. As a general rule, there was no difficulty in getting the necessary repairs done. By that he did not mean the whitewashing of a ceiling, but practically the demolition and rebuilding of a house. He could show them houses in his district which had been pulled down under Part II. and rebuilt, and were again occupied by the same people who resided in them prior to his representations. Of course, they must fully understand that he only spoke for Lambeth, and he thought he was justified in saying that no representation could be made under Part I. for any area therein. A question had been raised as to the correctness of his statistics from Liverpool. All his figures were given him by Dr. Hope or by the late engineer of that city—Mr. Boulnois—who definitely told him the houses were not subsidized out of the rates. The Manchester figures also were obtained from the medical officer of health and the borough surveyor.

A NEW MILK-PRESERVING PROCESS.*—A new milk-preserving process is being put to a test on the Continent. It is the invention of two Austrians, and takes the unusual form of preserving the milk, not in a fluid condition, but in the form of a powder. The milk about to be preserved is taken direct from the cow, and placed in a vessel at a temperature of about 40° C. (equal to 104° F.), and is there kept until the whole of the water contained in it has evaporated. The resulting residue is then thoroughly dried in suitable chambers, and after complete desiccation it is finally put into cans, which are hermetically sealed. With the object of increasing the keeping quality of the powder, and rendering it more readily soluble, the milk, prior to being evaporated, has added to it about one-tenth per cent. of an alkaline carbonate, which, when combined with fatty matters, forms a compound capable of easy solution in water. It is claimed for the new powder that it may be kept for years in these hermetically-closed vessels without its keeping being in any way adversely affected.

* Food and Sanitation.

METHODS OF DISINFECTION.*

PART II.

By W. LESLIE MACKENZIE, M.A., M.D.,
Medical Officer of Health of Leith.

INTERCALARY.—I. SURFACES *v.* CUBIC CONTENT.—In the first part of this paper I gave reasons for discontinuing the use of sulphur fumigation as a method of practical disinfection. I also indicated some physical considerations which appeared to me important. The chief one I should like to emphasize is that the application of a disinfectant should be reckoned not primarily by cubic space, but by superficial area. The assumption at the basis of all our practice is that room-walls are retainers and possible distributors of infection. The rest of the room is air, and foul air can be changed for fresh. It follows that surfaces alone are to be considered. This needs emphasizing, for the long habit of regarding disinfection as fumigation has dominated all our ways of writing about the disinfection of rooms. If we could safely blow infected dust from floors, walls, and ceilings, we should not need to discuss the sterilizing of the dust retained. But this is precisely what constitutes the particular problem.

II. THE STANDARD OF DISINFECTION FOR NON-ISOLATED PATHOGENIC GERMS.—In the matter of tests, we are to be guided as much by practice in hospital as by practice in the laboratory. Few of the pathogenic organisms are exceptionally difficult to destroy; but the question arises, May we safely assume that what kills the more feebly resisting will also kill those as yet unisolated—of scarlet fever, for instance, or measles? Is there any good ground for supposing that any infection of the non-isolated group is more resistant than the bacillus of tubercle, or the spores of anthrax? Or must we, to be safe, use nothing less potent than that which will destroy *B. subtilis* and its spores? Practice is able to furnish at least a partial answer. Take the following diseases—scarlet fever, typhus fever, measles, and small-pox.

1. Such coccal organisms as have been found associated with scarlet fever have proved less resistant than *B. subtilis*. It is certain that many of the well-known disinfectants have been found sufficient to extirpate scarlet fever infection. It is possible to render a scarlet fever case, and *à fortiori* scarlet fever clothing, incapable

* Part I. was published in PUBLIC HEALTH for March last, p. 488 of current volume.

of communicating fresh infection. If it be said that the infection loses in potency towards the end of the specific history of a case, the reply is—Does it? Experience of a “tailed” series of cases—one catching fire as the other goes out—will soon make discussion of that point superfluous. What kills tubercle may be safely held to kill scarlet fever.

2. The infection of typhus fever, again (even if we accept, provisionally, Drs. Porter and Barbour's diplococcus), is one of the most easily destroyed of any. If it is one of the most virulent infections, it is also one of the most vulnerable. Free exposure to the air robs the infection of its potency. Free exposure to air, however, is not possible where clothing is chronically filthy. I have found the ordinary processes—spraying with 2 per cent. formalin, steeping in izal ($\frac{1}{2}$ per cent.), in corrosive sublimate solution, etc.—sufficient. There is nothing to indicate any exceptional resistance in the specific organism of this disease. On the contrary, everything points to its feebleness outside the conditions special to its nurture.

3. With measles it is not different. The organism seems to die a rapid natural death whenever the conditions for its spread are removed.

4. Small-pox receives, naturally, very detailed attention. It is difficult to estimate how much of its decrease is due to vaccination and how much to destruction of virus. But I have not had any experience to indicate that the small-pox virus is peculiarly resistant to the action of the ordinary disinfectants. It is true I never gave it much of a chance. In disinfecting a small, overcrowded, two-roomed house, I used 10 per cent. formalin; but that was not because I had any scientific ground for believing that 2 per cent. would not have been sufficient, probably it would have been; but with extreme infections, like those of small-pox and typhus fever, one wishes to err on the safest side.

I do not wish to “whittle away” the seriousness of the non-isolated organisms; but it is legitimate to infer that, if the diseases are destroyed by the known methods of disinfection, their specific organisms are as easy to kill as those already known to us. The standards applied to the known organisms are also applicable to the known diseases due to organisms that are unknown.

To resume now the “choice of a disinfectant”:

(d) *Corrosive Sublimate*.—This is the disinfectant used by the Municipal Disinfection Service of Paris for the sprayers. So far as I can gather, no toxic results have been reported; but when I adopted the spray for house-disinfection, I hesitated to run any

risk. My hesitation has been justified by at least one episode. Recently, for the disinfection of some small-pox wards, I gave the disinfectors some powders of corrosive sublimate; each powder contained 70 grains of the sublimate and 15 grains of ammonium chloride; one powder making, with 1 gallon of water, a solution of 1 in 1,000 (corrosive sublimate). The men found the spray extremely irritating; it induced vomiting in both; it affected the bronchi in one, who continued to cough for a night, and was occasionally affected to vomiting. The symptoms passed off completely in less than twenty-four hours. There was no sign of salivation afterwards. Possibly the presence of ammonium chloride may have had something to do with the toxic symptoms; but one experiment of the kind was enough. The men both preferred the formalin solution to the corrosive. I have seen similar symptoms when the same wards were washed with 1 in 1,000 solution of corrosive sublimate. Apparently, the amount absorbed by inhalation was enough to induce squeamishness, and in one or two cases persistent vomiting. These facts would not be enough to justify the non-use of corrosive sublimate for spraying; but they certainly ought to induce great care in its use, and, since other less noxious disinfectants are available, I do not feel urged to the use of corrosive sublimate, even with its admittedly high disinfective potential.

(e) *Chloride of Lime and Hypochlorites*.—In the literature of the lime chlorides and hypochlorites there seems to be some discrepancy of statement. Probably this is due to the confusion of commercial names. About the disinfective efficiency of hypochlorites of lime and soda there is no discrepancy. The active ingredient is chlorine; the efficacy of the disinfectant is in direct proportion to the amount of available chlorine, and the only point for practice is—which is the least objectionable form of applying the gas to the walls, or securing its generation there? Two illustrations are enough to demonstrate efficiency: (a) Dr. Sheridan Delépine found that “if a weak solution, made with about one part of the original chloride of lime and 100 parts of water, was applied to the walls or to any paper impregnated with tuberculous matter, thorough disinfection was obtained in a few hours. Disinfection was invariably obtained in that way, and, in fact, an exposure of a few minutes was generally sufficient, even with a weak solution like the one he had mentioned, when the layer of virulent sputum was not very thick.”* Again, on experimenting with “hypochlorite of lime on various other germs than the tubercle bacillus,” Professor Delépine “found that

* *Journ. of Sanitary Instit.*, vol. xviii., p. 403.

every germ tried was rapidly destroyed when brought into contact with a 10 per cent., or even 1 per cent. solution of chloride of lime. . . . Anthrax spores placed for a few minutes in such a weak solution as that he had just mentioned were killed."* (In these quotations the terms "chloride of lime" and "bleaching powder" are, I presume, synonymous, and both are synonymous with "chlorinated lime." All three are names for a mixture containing chloride of calcium and hypochlorite of calcium, in varying proportions. It is a pity that one precise term cannot be agreed upon.) The results recorded in Dr. S. Rideal's book, and in the Maine Report, are somewhat inconstant. The inconstancy is mainly due to the inconstancy in the composition of the liquor resulting from the dissolving of chloride of lime. The liquor seems to contain chlorine in a quantity varying with the previous exposure of the chlorinated lime. If this be exposed to light or to moisture the amount of available chlorine is reduced. Consequently, to be quite reliable, the chlorinated lime must be fresh, if not freshly made. This difficulty could be easily overcome. But there are other objections to the chlorinated lime liquor—it bleaches and tarnishes. Even these are not insuperable objections; in many varieties of house and ship they are not objections at all, but they certainly take away from the general simplicity and convenience of the disinfectant. I am thinking chiefly of walls and furniture. Where clothing, sponges, and the like are in question, one objection is serious: hypochlorite or chloride of lime renders, or tends to render, these articles brittle and ready to disintegrate. The same happens with hypochlorite of soda. No doubt this disastrous effect can be avoided when the disinfective solution is very dilute, or the time of exposure is short. But, in routine disinfection, these are very serious difficulties; for usually the articles to be disinfected are not very clean, and, therefore, the solutions should be stronger rather than weaker; and usually the removal from the steeping tub must be left to the discretion of the lieges, and, therefore, over-time is certain to be rather the rule than the exception. On one occasion, I left two good sponges for an hour in a recommended solution of hypochlorite of soda (perhaps, as it ought to be, the solution was stronger than normal). They were beautifully bleached; they smelt wholesomely of chlorine. But when I began to use them, they came to little pieces in my hand. I have not experimented with linen, cotton, or woollen articles; but from the experience of others, I gather that the same disintegration is liable to occur. In the disinfection of walls this is less an objection. Professor Delé-

* *Journ. of Sanitary Instit.*, vol. xviii., p. 404.

pine applied his liquids by a brush. He says that the damage to papers, etc., was less than one might expect. Possibly, but other things sufficiently nearly equal, that disinfectant is best that does no damage at all. He suggests that the damage was due to the mechanical action. In that case the spray would be at once a partial preventive of damage and an adequate disperser of the liquid. In brushing, as in spraying, the object is to get the liquid on to the organism. The mechanical action of brushing is more gross and less regular than the wind action of the sprayer, and, therefore, the spray method is preferable. The only point open to argument is: Is the mechanical effect of the spray sufficient to drive the liquid on to the organism? To this the reply is that what blows cobwebs away is enough to blow liquid on to the cobweb dust. The spray thoroughly wets, under considerable local pressure, the surfaces exposed to it. What the hair-brush does the spray-brush—for it is a brush of fine threads of air and liquid—will also do (see section iv. *infra*). (b) An illustration from the Maine Report: "The careful work of Nissen* tended to confirm the value which Dr. Sternberg and the Committee of the American Public Health Association had ascribed to chloride of lime. Nissen's experiments were made with pure cultures of the bacillus of typhoid [*sic*], of cholera, of anthrax, and *Staphylococcus pyogenes aureus* and *Streptococcus erysipclatis*. The micro-organisms were in bouillon with 1 per cent. of peptone and 0.5 per cent. of common salt. Typhoid bacilli were destroyed with certainty in five minutes when the bouillon contained not less than 0.12 per cent. of chloride of lime, whether the mixture was filtered or not. Cholera bacilli were always killed in five minutes, and in most cases in one minute. . . . Anthrax bacilli, without spores, were destroyed in one minute with a 0.1 per cent. solution, and streptococcus just as quickly when the bouillon contained 0.2 per cent. of chloride of lime. Solutions of chloride of lime were found to lose their disinfectant power rapidly when used on anthrax spores. This was observed even in ten, fifteen, and thirty minutes after they were prepared. . . . Nissen says that chloride of lime may be added in the form of powder to dejections at the rate of 0.5 per cent. of the volume of the matter to be disinfected; or, taking into consideration the difference in the quality of the chloride of lime, 1 per cent. may be added (1 gramme to 100 cc.). The stool may be emptied in ten minutes after the addition of the chloride of lime."† (In the Maine Report chloride of lime is synonymous with hypochlorite of calcium.)

* *Zeit. für Hygiene*, viii. 62, 1890.

† Maine Report, pp. 199, 200.

(f) *Lysol*.—This I take as the type of a viscid, but soluble, disinfectant. It is held to be superior to carbolic acid in disinfective power. For washing of wood-work, floors, beds, etc., it is eminently suitable, being at once a soap and a disinfectant. For such purposes it should be used in hot solutions of 1 to 2 per cent. For the purposes of spraying or showering it is more suitable than the emulsions, but less suitable than the clear liquids. With its other numerous uses we are not here concerned.

(g) *Carbolic Acid and Common Salt*.—A disinfectant so well accredited by so many various masters as carbolic acid hardly requires mention. But carbolic acid will not do everything, and to do anything it must be intelligently handled. With the anthrax spore test it fails, like most others; but the range of its efficiency is wide enough for most practical purposes. For disinfecting walls by washing or rubbing, it may be sufficient; but in the practicable solutions it is certainly less reliable than the hypochlorites, or corrosive sublimate, or formaldehyde. "In a paper on the molecular conditions of aqueous solutions of disinfectants, as regards their efficiency, Dr. Scheurlen states that 1 per cent. solutions of carbolic acid, or of the cresols, in water failed to destroy *Staphylococcus pyogenes aureus* in five minutes; but 1 per cent. solutions of carbolic acid, with 24 per cent. of common salt, or 1 per cent. cresol, with 12 or 13 per cent. of common salt, destroyed the same organisms in one minute. He found also that 1 per cent. carbolic acid with 12 and with 20 per cent. of common salt, and $\frac{1}{2}$ per cent. as well as 1 per cent. of cresol, with 13 and again with 19 per cent. of common salt, destroyed anthrax spores in three days at latest, while these solutions without the addition of the salt had hardly the slightest effect upon the spores."* These are striking facts. Surgical habits have, I suspect, had a good deal to do with the uncritical belief in the high disinfective potential of carbolic acid.

(h) *Formaldehyde*.—The disinfective efficiency of formaldehyde it is convenient to discuss under two heads—1. Efficiency as a free gas; 2. Efficiency as a solution in water (formalin) or alcohol (holzlin). The disinfective agent is always the gas, but for some reason or other the results of the free gas do not quite conform with the results of the gas in solution. The same was true of sulphurous anhydride and sulphurous acid. The precise physical and chemical reasons for this I need not speculate upon; what concerns us now is the fact of the discrepancy. A few selected

* Maine Report, pp. 191, 192; *Archiv für Exper. Pathol. u. Phar.*, xxxvii. 74, 1896.

facts will determine whether, for our primary purpose of room disinfection, either the free gas or the dissolved can be relied upon.

1. *As a Free Gas*.—The gas has been put to very severe tests, and has come out on the whole well. Authorities are not unanimous, but very nearly so. The objective results recorded are certainly very strongly in its favour. Professor Sheridan Delépine names the following organisms as the "most convenient for testing gaseous disinfectants": *Bacillus coli communis*, *Bacillus pyocyaneus*, *Staphylococcus pyogenes aureus*, *Bacillus subtilis* (sporing), *Bacillus anthracis* (sporing), *Bacillus tuberculosis* in sputum, fresh or dry, horse manure with highly-resistant sporing bacilli. These are to be taken in young or old cultures, in emulsions, on threads, on agar, etc. He adds: "I think a disinfectant capable of killing the six first organisms exposed to it in various states and under various conditions is, for practical purposes, a reliable disinfectant. If, in addition, it is capable of destroying the spores usually found in horse manure, and which often can resist for half an hour the action of saturated steam at 100° C., the disinfectant may be considered as exceedingly powerful."* How does formaldehyde stand these tests? Thus: "(1) With unimportant exceptions the *Bacillus coli communis*, *Bacillus pyocyaneus*, *Bacillus tuberculosis*, and *Staphylococcus pyogenes aureus* were killed whether in the dry or moist state, even when placed in deep narrow recesses (2 inches from the opening of tubes open only at one end, or protected by one to three layers of filter-paper, or embedded in a thick layer of sputum). (2) The spores of the *Bacillus anthracis* were killed in twelve experiments out of nineteen, made under conditions not favourable to the free access of the gas. The differences in the results seem to have been due more to certain states of the spores than to variability in the action of formic aldehyde. (3) The action on spores of the *Bacillus subtilis* was uncertain. The very highly-resisting spores of a horse-manure bacillus resembling the hay bacillus could not be killed by exposures of a practical duration. The only evidence of action was a distinct delay in their growth."† He adds, further, that "wood spirit of the proper quality and strength costs 10s. a gallon. . . . It is quite evident that formaldehyde is the best gaseous disinfectant we possess at the present time for objects which are liable to be damaged by damp, chlorine, dry and moist heat." Now as to quantities and time of exposure. One or two instances

* "Some Experiments on the Disinfection of Rooms by Gaseous Formaldehyde," *Journal of State Medicine*, 1898.

† *Ibid.*, p. 15.

are enough. In three experiments with silk threads impregnated with thick emulsion of anthrax spores and kept dry in the dark for eighteen months, the duration of exposure was twenty-four hours; the amount of alcohol consumed was 5,900 m.; the distances of the objects from the lamp were respectively 9 feet, 6 feet, 10½ feet; the cultivating test media were respectively bouillon, agar, bouillon. The result was complete sterilization in each case. The control experiment gave abundant growth. In five experiments with partially-dried tuberculous sputum, the duration of exposure was twenty-four hours. The amount of alcohol consumed was 2,950 m.; the distances were as in the anthrax experiments. In every case the result was complete sterilization. For practice, the only point to decide is this: Can Professor Delépine's conditions be reproduced? This I shall discuss further on.

These striking experiments are in many ways confirmed by the work of Messrs. F. C. Robinson and B. L. Bryant in their "Bacteriological Report upon Formaldehyde."* But their results are best discussed under methods of application. All the leading facts have been summarized by Dr. A. G. Young.† With two or three exceptions the authorities speak in the same sense as Professor Delépine.

2. *In Solution*—*Formalin (water), holzin (alcohol)*.—That the disinfective potential of formalin (that is, 35 to 40 per cent. solution of formaldehyde) stands very high is now beyond dispute. Blum, Vanderlinder and Burk, and Strehl are the only investigators whose results are not favourable. But Blum admits that "weak solutions suffice to prevent fermentation with gradual destruction of the bacteria."‡ The evidence on the other side is overwhelming. Mosso and Paoletti find "that 1 part in 20,000 slows the ammoniacal fermentation of urine, and that 1 in 4,000 inhibits it entirely. . . . Walter states that a solution of formalin, 1 in 10,000, prevents the growth of the bacilli of anthrax, cholera, typhoid, diphtheria, and of the *Staphylococcus pyogenes aureus*. . . . In 1 per cent. solution it kills a pure culture of almost any pathogenic micro-organism in thirty minutes. In 3 per cent. solution it kills anthrax bacillus in fifteen minutes, and all other pathogenic micro-organisms in one minute."* Walter also found that faecal matter was almost instantaneously deodorized by a 1 per cent. solution, and sterilized in ten minutes with 10 per cent. solutions. Philipp found that "with formalin anthrax bacilli were killed in

* Maine Report, 1896-97, pp. 132-169.

† *Ibid.*, pp. 234-265.

‡ *Ibid.*, p. 235.

* *Zeit. für Hygiene*, April, 1896, summarized in *Medical Annual*, 1897, p. 40.

fifteen minutes with a 10 per cent. solution, and anthrax spores capable of withstanding action of steam at 100° C. twelve minutes were destroyed in less than five hours with a 10 per cent. solution. With a 5 per cent. solution, diphtheria bacillus was destroyed in ten minutes, anthrax bacillus in fifteen minutes, *Staphylococcus aureus* in thirty minutes, and anthrax spores in five hours."* Even some that doubt the efficiency of the free gas in dust-disinfection acknowledge the efficiency of the solution. Thus, Professor Sims Woodhead: "From what one knew of its action in solution there could be no doubt that formic aldehyde or formalin was an exceedingly powerful disinfectant."† Dr. Blaxall is reported to have sterilized milk by a solution of one part formalin in 500 milk. Probably some organisms are much more susceptible to this disinfectant than others. This would explain the slight discrepancies recorded. Then, in confirmation of its disinfective potential, formalin is a powerful deodorant. Anyone that doubts this may relieve his doubts by sprinkling a few drops of formalin in a lobby or room that smells of "cats." The "cats'" smell is almost as pervasive and persistent as musk, to which the odoriferous agent may be allied; yet, in a very short time, the odour yields before formalin. "Aronson says that formaldehyde combines readily with nearly all ill-smelling compounds, as hydrogen-sulphide, mercaptan, and ammonia, forming others that are non-offensive."‡

These are only some striking selections from a vast mass of evidence. They are enough to justify the inference that if the pathogenic organisms are subjected for a sufficient time to a sufficiently strong solution of formalin, the result will be disinfection. The strength of solution is limited by considerations of practice. I have used for ships, and for some rooms, a 10 per cent. solution. But when this is sprayed the operators cannot long occupy the room. When, however, rooms or forecastles are small the operators can stand near the door; they can begin at the distal parts first, and retreat gradually. For routine purposes, I use a solution of formalin 1 part, and water 40 parts; that is, formalin 4 ounces, water 1 gallon. This, however, is qualified by one fact. To prevent the polymerization of formaldehyde in the original formalin, I add to each gallon bottle about 5 ounces of glycerine. This prevents any precipitate. It also results in making the solution dry more slowly. This means that the gas is longer retained in the solution; for, as can easily be shown, formaldehyde is very readily absorbed by moisture, and therefore, of course, is long retained by it. This

* *Centr. für Bak.*, xvii. 499, 1895, in Maine Report, p. 236.

† *Journ. of San. Instit.*, vol. xviii., p. 420.

‡ Maine Report, p. 237.

secures longer exposure of the wall-dust to the action of the gas. The amount of glycerine, however, is not enough to make the sprayed walls damp for any considerable time. Since I began to use glycerinated formalin, I have had no complaint either of the precipitation of the formaldehyde or of the hyper-hygroscopic effects of the glycerine. A German observer recommends spraying with "glycero-formol"—the glycerine preventing polymerization.

Does formaldehyde penetrate? It is important to answer this question, but it is hardly relevant to my primary topic; for penetration rather concerns clothing, mattresses, etc., than surfaces of walls and furniture, and I have shown that steam methods are the best for clothing, etc. All the same, formaldehyde does penetrate more than any other gaseous disinfectant. The vacuum principle could easily be applied to increase the penetration. It has been applied by Dr. Kinyoun.

IV. METHODS OF APPLYING DISINFECTANTS TO SURFACES.—So much for the efficiency of these selected disinfectants. Many others, it is unnecessary to say, might be named, and these are in no way prejudiced by anything I have said. Like those I have selected, they must go by the scientific evidence they can produce, and many of them can produce much evidence. The matter I am mainly concerned with is, given an efficient disinfectant, how shall we apply it efficiently to the surfaces of a room and of its contents? There is a long distance between the exact conditions of experiment and the rough conditions realizable within the limits of possible practice. But the distance has to be bridged, and the following are four good methods of bridging it. Personally, I prefer the last of the four, because, in my experience, I have found it best fulfil the three conditions I have found of most importance in the evolution of the disinfective organ of the public health service. The three conditions are: simplicity, rapidity, and cheapness. Its efficiency I consider equal to any of the others.

1. *Disinfection by Free Gas.*—Here I consider only the methods of applying formaldehyde. The only other gas that deserves further discussion is chlorine, and that is best applied—not as a gas, but as a solution—by brush, shower, or spray.

In all forms of disinfection by a free gas the object is twofold: first, to disinfect the air—a useless labour; second, to disinfect the surfaces of room and furnishings. To secure the second object, it is essential to fill the cubic content of the room with the gas. To do this it is necessary to prevent the escape of the gas by blocking of outlets. Here is the great practical difficulty. To stop the outlets even of a fairly well-built modern room is a matter of patient

and detailed labour. The major outlets—windows and fire-places—can be dealt with easily; the innumerable minute outlets only with very great difficulty. In dilapidated or ill-constructed rooms the stoppage of outlets is frequently impossible, yet such are frequently the houses demanding most thorough disinfection. In Professor Delépine's experimental room the necessary conditions were secured. In the rooms described by Messrs. Robinson and Bryant, similar care was taken to prevent rapid dispersion of the gas. With formaldehyde, however, the rapidity of dispersion is less than with gases whose density is nearer the density of the air. Yet even with formaldehyde the stoppage of outlets is essential to the concentration necessary for disinfection. For my own part, I consider that the stopping of outlets—or inlets—is a matter of considerable skill; it is also a matter of considerable time; it is rarely a matter of simplicity. Doubtless it can be done; but the doing of it adds to the bother of the disinfection. But let it be distinctly understood that to attempt formaldehyde disinfection without the stoppage of outlets is to reduce it to the same level of farcical futility as sulphur-fumigation frequently—not, of course, always—falls to. Let us, however, assume the stopped outlets.

(a) *Evaporation of Formalin*—(a) *Sheet Evaporation.*—To hang in the room sheets soaked in formalin is a simple method, and probably may be made adequate. But there ensues a great waste of formalin, for there is left a polymeric residue. This may be re-utilized by exposure to heat, or reconverted into formaldehyde by hot water; but to the extent that it is polymerized, it is for the time inert. For the disinfection of small articles or delicate fabrics, however, the sheet method is good and useful—that is, the amount of formaldehyde communicated to the fabrics is sufficient for disinfection, but for room disinfection proper it may be discarded.

(β) *Heat Evaporation.*—To prevent polymerization during evaporation, several pieces of apparatus have been constructed. Trillat's is designed to evaporate, under pressure, a combination of calcium chloride and formaldehyde. In practice, the objections to his apparatus outweigh, in my opinion, its advantages. And there is evidence to prove that "the polymerization of formalin while undergoing distillation is largely a myth."* "If rapidly distilled, polymerization rarely occurs."† Novy has designed a vessel for such rapid distillation. "A good Bunsen burner will distil five ounces of formalin, the amount necessary per 1,000 cubic feet, within ten or fifteen minutes. Should there be a tendency of the formalin to polymerize, it can be prevented by the addition of 5 or

* Novy, Maine Report, p. 239; *Medical News*, lxxii., p. 641, 1898. † *Ibid.*

10 grains of borax."* Definite results are not given, but they seem to have been good. Provided, therefore, the conditions are such as to insure the necessary concentration, the evaporation of formalin will give sufficient formaldehyde. The vaporization of "paraform" may be mentioned under this head. It is really a repolymerization of formaldehyde.

(γ) *Formogenic Apparatus*.—Formaldehyde may be directly generated from methylic alcohol. The apparatus used by Professor Delépine was the Formogène Richard. Others are, the Moffat generator and Bowdoin generator, and there are still others.

Of all generators tested by the American investigators, one thing was true: "Of all the forms of apparatus tested, none of them can be relied upon to sterilize free surfaces in five hours with the amount of material advocated by their different manufacturers. . . . None of them came up to the standard claimed for them."†

(δ) *Temperature, Dampness of Objects, etc.*—Temperature is of some consequence. The higher the temperature, the more rapid the disinfection. But the variation in efficacy is not great between 50° F. and 80° F. (room temperature). Dampness of walls is also of some importance. Professor Robinson "says that dampness is a disadvantage as it absorbs more or less of the gas and holds the odour in the rooms."‡ But "Navy found that infectious material is much more readily disinfected when it is moist. Even wet spore material is thoroughly disinfected by formaldehyde, whereas such material is not affected by sulphur. He found that the walls and floor of the room to be disinfected, and whatever articles are present (previously spread out as much as possible), should be sprayed with water before exposure to formaldehyde vapour. Owing to the great solubility of formaldehyde, large vessels of water should not be kept in the room to be disinfected. When water is thus kept in the room, scarcely any odour of formalin will remain at the end of twenty hours, whereas, in the absence of such water, the odour at the end of the time mentioned will be intolerable."§

A reasonable deduction from these physical peculiarities of formaldehyde is that the ends of the free-gas method are well attained when the gas is dissolved up by the moisture on the walls or objects. But this is only another way of saying that a solution of the gas applied to the walls is an efficient method of disinfection. If this is so, would it not be less roundabout to squirt, or shower, or brush, or spray the solution directly on? Is it not probable that, since the solution can be first graded to a more than sufficient

* Navy, Maine Report, p. 239; *Medical News*, lxxii., p. 641, 1896.

† Maine Report, p. 153.

‡ *Ibid.*, p. 242.

§ *Ibid.*, p. 242.

strength, the direct application of it to the walls will be *à fortiori* more reliable than the application of water and gas separately? In fact, the results with the free gas are a most powerful confirmation of the methods where the solution is applied directly—that is, of the brush, or shower, or spray.

Before passing to these, I may note that the results obtained when the formogenic lamps were used to fill an air-tight bag containing infected clothing were excellent. Indeed, we here have a method that, for disinfection of clothing, might become almost a perfect substitute for steam. To secure penetration, it might be possible to arrange an application of the aspiration pump. Dr. Kinyoun has devised a metallic "disinfecting chamber, to which is attached a vacuum apparatus, a small boiler in which formaldehyde is generated by volatilization from a mixture of formalin and calcium chloride, and a second small boiler from which ammonia is turned into the disinfecting chamber by the evaporation of ammonia water."* These appliances are still in the experimental stage, but the non-spoiling of fabrics is a strong point in their favour.

2. *Disinfection by Moist Brushing or Rubbing*.—Of the efficacy of brushing or rubbing with disinfective solutions, there is no question. Professor Delépine's results are decisive. In many towns no objection is taken to the method. But it is admitted that such a method involves the spoiling of wall-papers. It is also very laborious. Except for special cases, therefore, the method seems to me loaded with disadvantages. With any of the solutions I have discussed, brushing may be made effective; the mechanical action counts for something. But, after all, the essence of the matter is the wetting of infectious material with a sufficiently strong disinfective solution. This can be done by shower or spray with sufficient mechanical force to insure thorough wetting, yet without any destruction of the paper, except when the disinfectant has chemical effects on the colour. These effects, as I have already stated, are among the disadvantages of the hypochlorites. With solutions of formalin, as I have shown elsewhere, there is no destruction of paper and no interference with colours. In very soft papers, occasionally there may be some "running"; but after four years of formalin I have had not one complaint of destroyed papers.

3. *Disinfection by Jet or Shower*.—Here again the purpose is to wet thoroughly the surfaces to be disinfected. This, like spraying, can also be done without destruction of papers. With suitable appliances, it could be made simple, rapid, and cheap. There must

* Maine Report, p. 239.

be a certain extravagance in the amount of liquid used, but this is no great objection. In jetting or showering with formalin there is the double advantage of a solution and a gas. The "misting" due to the wetting of floors is, if kept short of "damages" point, an advantage; it compels the housekeeper, for the sake of comfort, to clean up. The same is true of the spray.

4. *Disinfection by Spray.*—(a) *General Results.*—In the *Sanitary Journal* for March, 1897, I gave some account of the spray method. My experience since then has confirmed me in the positions there maintained. In hospital disinfection I have used the formalin spray for over four years. In general disinfection I have used it for over three years. More than 2,000 houses or rooms have been sprayed. I have ceased to keep any record of the number of hospital wards disinfected. I may state generally that the sprayings included cases of typhus and enteric fevers, diphtheria, small-pox—modified, discrete, confluent, and hæmorrhagic—chicken-pox, measles, scarlet fever, erysipelas, cellulitis, and anthrax. Wards occupied for six months with scarlet fever have been sprayed and then used for measles. Wards occupied for months with measles have been sprayed and used for chicken-pox. Wards exposed for weeks to chicken-pox have been sprayed and used for measles. And so on. Diphtheria has been housed after scarlet fever, and scarlet fever after diphtheria; scarlet fever after whooping-cough, and whooping-cough after scarlet fever, the whole yielding a large variety of permutations and combinations. In houses second cases frequently occur within the incubation period; but, except in one or two cases where personal contact with a patient was proved, I have not had a recurrence of infection. In the hospital I have never had any cross-infection after spraying except once, and that was found to be due to an undiscovered case of scarlet fever still persisting after an outbreak due to a case of mixed diphtheria and scarlet fever infection. A considerable number of those double cases had been admitted, and one or two escaped observation, the evidences of diphtheria predominating. The result was that several diphtheria patients developed scarlet fever. One could not attribute the spread entirely to conveyance by nurses. Part of it was, in all probability, aerial. After a thorough disinfection, yet another case occurred, and this, as I have said, was due to an original case that had escaped observation. When this was removed and the ward again sprayed, no fresh case appeared. This outbreak showed that the patients in a ward may be rapidly infected; it also shows that isolation and disinfection are efficient to stamp out such infection. The amount due to the infected room it is impos-

sible to specify precisely; it is equally impossible to eliminate that amount altogether. More stress may be laid on the disinfection of houses and wards infected with typhus fever, small-pox, and measles. In no case have I found recurrence except within the incubation period. Further, I have noticed that after a scarlet fever pavilion has been some months in use, it begins to grow more or less unhealthy, even when kept as clean as hospital methods make possible, and that is *very* clean. One notices more swollen glands, more irritated eyes, more eczematous mouths and noses, more small abscesses, more slowly mending throats, and so on. In such circumstances I have shifted the whole camp, sprayed the pavilion, and in a few days reoccupied. The result has always been good. The known habits of microbic life in occupied rooms would lead us to expect nothing less. The dust on hospital walls is mainly wool from the beds. These, in a scarlet fever ward, must be regarded as the most infectious articles in the ward. Consequently, in such wards, the persistence of streptococcus or staphylococcus, in some form, is almost normal. These organisms must be kept in check. To them many of the minor ailments I have referred to are doubtless due. Under the formalin spray such ailments vanish. The pre-Listerian experiences of hospitalism are only too ready to repeat themselves; but the repetition is now inexcusable, for hospitals can be so constructed as to make cleansing and disinfection easy.

These large effects are among the best confirmations of the efficiency of any method. They are less definite in detail than the results of laboratory experiment; but they are equally impressive in the mass. I could add many other groups of facts; for example, an outbreak of measles in a scarlet fever ward (owing to an imported case), shifting of the camp, spraying, reoccupation without occurrence of fresh cases. Such isolated groups have little value by themselves. They must be taken as part of a sustained experience. When the facts are of a well-understood order, as when a surgical wound is nursed in an erysipelas ward, they fall in with the great body of experiences that form the scientific basis of aseptic surgery. More than once I have nursed a tracheotomy case in a ward sprayed after being recently occupied by an erysipelas case. Such exposures, however, have been, in my own experience, too few to found any negative proposition upon them. At the same time, every surgeon knows the susceptibility of open wounds in an erysipelas ward, and the treachery of erysipelas once it enters a surgical ward. On one occasion a surgical ward in a general hospital had somehow become infected; two or three fresh

cases occurred. The ward was fumigated with sulphur, and the usual measures taken with floors and beds, but cases continued to recur. It was then sprayed, and correspondingly radical measures were taken with beds, utensils, etc. No fresh cases occurred. Here the spraying was only a part of the general sterilization; but it was the greatest part so far as the ward itself was concerned.

These facts, and such as these—the changes rung on infected wards, the interchange of diseases carried out as nearly as possible on the principles of aseptic surgery, the vanishing of minor ward ailments, the sweetening of houses—have combined to confirm not only the masses of evidence in favour of the high potency of formalin as a disinfectant, but also the particular method of applying it to infected areas.

(b) *Some Practical Points.*—(a) *Time of Exposure.*—An important point to settle is—How long does any dust on a wall remain exposed to the disinfectant applied? If corrosive sublimate is the disinfectant used, one minute is sufficient to disinfect non-sporing germs, and five minutes, or thereby, to disinfect anthrax spores. If formalin is used, in 2 per cent. solution, I should say that at least five minutes' exposure ought to be secured; but, if possible, half an hour, or an hour, or longer. Now, with the spray, I have found as follows: *First*, A varnished wooden wall of a hospital was sprayed on a frosty day. The temperature of the ward was about 40° F. The drops of liquid remained quite visible, and on rubbing with the finger the surface was found quite moist at the end of four and a half hours. This was several times repeated. *Second*, In a hospital ward, with impervious walls, the wall remained moist for one and three-quarter hours, although the part was exposed to a mild sun shining through a window. In the shade the same wall remained moist for at least three hours. *Third*, I have made no exact observations on papered walls; but here the capillarity of the paper plays a part. The effect is the same as when a paper is soaked in a disinfectant. The rate of drying depends on the temperature and the amount of water-vapour. This, in a recently sprayed room, is necessarily great; evaporation is, consequently, slowed down, and, in every case, one may be reasonably certain that the time of exposure will not be less than half an hour to an hour. From rough observation, I am inclined to regard the time of drying as much longer. But other tests are available with formalin. For, so long as any gaseous smell remains, formalin is being given off from the walls. Now, I have sometimes found a strong smell of formalin in a sprayed room at the end of twenty-four hours. In the hospital first-named, when the temperature

was low, the disinfectors found that a ward sprayed on one afternoon was almost intolerable next forenoon—a period of eighteen hours, and this without any special effort to retain the gas. In warm rooms, where a fire is active, the smell, intolerable at first, vanishes rapidly, but it is usually powerful even at the end of four or five hours, unless special measures have been taken to ventilate. The persistence of the smell indicates that the formalin on the walls is still active. And, with papered or sized walls, the absorption of the liquid secures its better diffusion. Spraying becomes a soaking. I should add that, with formalin, the spray acts not only as a moistener, but also as a fumigator. It applies the dissolved gas in the first instance to the most important surfaces, but, thereafter, the gas is set free to penetrate the parts that the liquid may have missed. This cannot at any time be great, for a good sprayer throws a cloud of about 5 feet by 2 or 3 feet; this soon fills a room, and every globule gives up something to the atmosphere. Thus it seems to me that, while the advantages of forced application of a strong liquid are gained, the advantages of a subsequent fumigation by formaldehyde are not lost. The delicate mobility of the spray-cloud makes it applicable to any shape of room, press, closet, wardrobe, or other combination of the inconveniences that fill the ordinary “furnished” bedroom. This point I mention because it has been maintained that the spray can be relied on only if every part is “religiously” wetted. Every part ought to be wetted; but the wetting is not, with formalin, the whole case. On one occasion I took some friends into the ambulance shed at East Pilton Hospital. The odour of formalin was so strong that they had to withdraw. The ambulance had gone out an hour before; the driver had sprayed it, and the diffused formalin in the large well-ventilated shed was the remnant of the spraying.

(B) *Strength of Solutions.*—Of formalin, I use a solution of 1 in 40; that is, formalin 4 ounces, water 1 gallon. Recently, on account of the addition of glycerine, I have used a little over 4 ounces; in cases requiring special disinfection, 6, 7, 8, and 10 ounces to the gallon. On the basis of the facts already given, I consider that, with 1 in 30 to 40, there is ample margin for any reasonable variation in the time of exposure. For the other solutions the standard strengths would be—corrosive sublimate, 1 in 1,000; hypochlorite of calcium or soda, 1 per cent.; lysol, 2 per cent.; carbolic acid with salt, 5 per cent.

(γ) *Management of the Equipex Sprayers.*—I name these, because I am not familiar with the working of others. There are several little points of management that make all the difference between

satisfaction and dissatisfaction in the use of the spray. Perhaps I shall be well enough within my title if I detail one or two such points.

(1) *Length of Tubes.*—For convenience of working I prefer 12-foot tubes to either 8-foot or 6-foot tubes. Doubtless the labour is somewhat increased by the increased column of water; but the adaptivity of the sprayer is also increased. Where two men work the instrument—one as the pumper and the other as the disperser—12-foot tubes increase the convenience many fold. The longer the tubes the longer the pumper may remain in one spot, and the more regularly may the disperser work. Indeed, in small rooms the pumper barely needs to change his *locus* at all. The disperser, on the other hand, finds it easier to manipulate the nozzle freely, and to direct it under beds, into drawers, under mattresses, behind doors, behind wardrobes, and so on. Where the roof is over 8 feet high, it is a great convenience to have over 8 feet of tubing to work with. Further, the longer tube secures a more equable production of the spray-cloud. As the arteries, by their elasticity acting against a frontal resistance, convert a pulsating into a non-pulsating current, so the more diffused elasticity of the longer tubes maintains a steadier pressure of air and water. This can be readily tested. If, after the air-pressure is high, the air and water stopcocks are both closed, the spray still continues for a considerable number of seconds. With the shorter tubes, the current stops in a second or two. Once more, the longer the tube, the thicker their walls should be. The thinner tubes readily form "aneurisms" under the pressure. Probably such high pressure is never needed, but it is apt to occur in practice. For the two-men system, longer and thicker tubes increase the convenience; for the one-man system, shorter tubes diminish the labour.

(2) *Adjustments.*—With the larger equifex instruments, where the air-pump is the only pump, there is usually no difficulty in adjustment. I hesitate to detail the extremely elementary mechanical directions necessary for satisfactory sprayings; I should hesitate still more had I not found them sometimes beyond the skill of intelligent, but non-mechanic, workmen. To make the sprayer work properly, it is necessary to have the rubber tubes clean, unobstructed, and properly fastened; to have the air-pump well oiled both in the piston and piston-rod (I had an apparatus seriously spoiled for want of so seeming simple a precaution); to secure that the ball-valve is acting freely; to cleanse it with benzine if necessary; to see that the tube between air-pump and cylinder is free of grease or other obstruction (benzine being here

again useful); to test the patency of the air outlet and water outlet before fastening on the rubber tubes; to test separately the air-tube and water-tube after fastening; to see that the internal nipple of the air-tube is perfectly pervious (it is apt to be choked by shreds of rubber or dirt); to examine from time to time the collared retarder of the water-tube, and to see that it is pervious; to see that the stopcocks are tight; to wash out the cylinder frequently. In the larger apparatus I have found it best to turn on the water first; then slowly to turn on the air until the necessary fineness of spray is obtained; then with slow, steady thrusts to maintain such pressure as will give the particular best "note." Every sprayer has a pitch of its own when it is at its best. The men prefer to secure this note first, and to maintain it all through the operation. Again, if the spray tends to squirt, it is occasionally because some water has passed into the air-tube. Let this be pumped clear, and a little readjustment for higher or lower levels will prevent the squirting.

With the more portable apparatus, which has two pumps, one for sucking up the water, the other for forcing in the air, adjustment is more difficult. The secret of rapid adjustment lies in the feed-pipe. The stopcock on this should be turned off until the apparatus takes up just the amount necessary to keep a constant spray. The other stopcocks should be adjusted correspondingly. I have found that the bottom nipple valve is apt to freeze on exposure in cold weather. Care is needed in thawing. I should not think of noting these trifles did I not know that they have given rise to difficulties. I may add that the pumping labour of the more portable spray has been found distinctly less than of the heavier, and this without impairing the extent or quality of the spray-cloud. Frequent oiling is absolutely essential in the lighter apparatus. The apparatus should be pumped empty after a day's use.

As a criticism of both appliances one may say that the heavier is needlessly heavy and clumsy; the lighter suffers from the necessity of a detached vessel for the liquid. To meet the latter point, I am adjusting a light vessel to the outside of the cylinder. Vessel and cylinder can be strapped to the pumper's leg, and thus the stability of the whole sprayer is improved.

Conclusion.—In this discussion I have attempted to be at once critical and practical; to base my opinions and inferences only upon adequately demonstrated facts; to select instances relative to the limited problem of room-disinfection; and, finally, by a sifted correlation of practices, to educe a simpler practice.

PRACTICAL RESULTS OF EXPERIMENTS IN SEWAGE TREATMENT.*

By T. W. H. GARSTANG, M.R.C.S., D.P.H.,

Medical Officer of Health of Bucklow Rural and other Sanitary Districts.

THREE days ago I prepared the very short paper which I have to submit to this meeting, but within those three days I have received so many applications to attend from persons interested in the question, whom I am delighted to welcome, but who may very possibly not be advanced students in the science of sewage treatment, that I find myself at the last moment confronted with a practical difficulty: Either I must deliver an elementary lecture for their instruction, which would not be fair to the experts who are present; or I must address the latter from a point of view which assumes considerable knowledge of elementary facts. Perhaps I can compromise the matter by enumerating the principal points which are now commonly accepted, for the benefit of any learners present, and then proceed to open the discussion with the paper as already prepared.

We all now admit that it is possible to treat sewage so as to entirely avoid the formation of sludge. In this process it is quite unnecessary to employ chemicals. Mr. Dibdin, at Sutton, demonstrates this by his cinder filters (or "contact-beds," as I prefer to call them, in order to keep firmly before you the fact that the action which takes place is very different to a mere mechanical straining); Colonel Ducat at Hendon with a quite different arrangement of contact-bed; and Mr. Cameron at Exeter by aid of a closed tank. Finally, various workers are now engaged in showing that the same result can be attained in an ordinary open tank. These must be accepted as facts, and then we can proceed to examine results and build up theories about them.

It is supposed that the solid matters in sewage are entirely liquefied, under favourable circumstances, by anaërobic bacteria, and that the resultant solution is afterwards further purified by aërobic bacteria.

How to discover the best method of bringing these bacteria under control is the sewage problem of the day. Nobody will be rash enough to assert that any known system has reached finality; we are all still searchers and learners, and we can profit by one another's advances, no less than by one another's mistakes.

* Read before the North-Western Branch of the Incorporated Society of Medical Officers of Health, March, 1900.

This meeting is unique in my short experience of this Branch, in that the members present are outnumbered by their visitors, and those visitors are all men practically interested in the subject of my paper, which has, perhaps, on the other hand, only a theoretical and scientific interest for the majority of medical officers of health. I much appreciate the honour which has been paid me alike by members and visitors in meeting at this somewhat out-of-the-way place to discuss my experiments.

My attention was first drawn to the subject by the remarkable series of papers read at the Leeds Congress in 1897, and the interesting and valuable discussion which followed them. I then made myself practically acquainted, by personal visits of inspection, with the principal sewage-works then generally referred to as typical of the new ideas of bacteriological treatment. First I visited Exeter, then Sutton and Hendon; and since that time I have frequently visited the Manchester Corporation works at Davyhulme, where most important experience of actual working is being daily accumulated; also Oswestry, Crewe, Birmingham, Accrington, Chesterfield, Middleton, and many other smaller places. Each of these has distinctive features, and it has been my ambition to devise a scheme which should include the best points of all, together with, if I could possibly find it, some original improvement of my own.

The Hale Works, which I have shown you to-day, embody at least three such original ideas, which, although shown in combination, are really independent of each other, and had better be described separately before concluding with a few words on the actual scheme in operation.

I purposely call the works "experimental," although they are working on the practical scale of dealing with the whole of the sewage of the township of Hale, which is about 150,000 gallons per day in dry weather, rising to upwards of 500,000 in times of rain. I do so because I fully recognise the possibility of further improvements, and because the object of this meeting is specially to invite criticism and discussion, from which I shall hope to profit in the future.

The first point which I recognised as a vital necessity, and upon which I feel that I cannot lay too much stress to-day, is the provision of an automatic mechanism for breaking up the regular flow of sewage into separate quantities, which shall be intermittently delivered in different directions. This is done by the mechanism which you have just seen, which has the further advantage that it is actuated by the flow of the sewage itself, and so, when once

installed, working expenses are reduced to a vanishing-point. The mechanism was devised by Mr. Ridgway, who is present to answer any questions about it. He is entitled to the whole credit for his ingenious invention as a mechanical engineer. Messrs. Mather and Platt, of the Salford Iron Works, have built the machine for him, which is sufficient guarantee of excellent workmanship. The scientific principle, however, which the machine is designed to carry out is applied according to an idea of my own, and for the originality of that idea I put my claim formally on record. Similarly, Mr. McKenzie, the Surveyor and Inspector to the Bucklow Rural Council, is entitled to all credit for designing and executing the civil engineering works which, along with the mechanism, complete the scheme as far as it has gone. Mr. McKenzie also is present, and will answer any questions as to his department. You have seen two machines at work; the first of these commenced on December 17th, 1898, so that it has weathered two winters. In the late severe storm a few weeks ago the frozen snow on the cams threw it out of work, but with this exception it has never failed to perform its work automatically to our complete satisfaction. As it was purposely left exposed to the weather, in order to make the trial as severe as possible, any repetition of this accident can be easily avoided by simply boxing it in. I do not propose to waste time in arguing about this machine. If you grant that the object with which I started is a proper one, then I can conscientiously certify that it is fully, completely, and satisfactorily carried out by Mr. Ridgway's invention.

As a matter of form, I will briefly recapitulate the description. The sewage flows uniformly into a chamber at the rate of 72,000 gallons per day; the chamber holds 1,000 gallons; it is discharged once every twenty minutes by a siphon. This occupies four minutes. The discharge is then received in a second chamber, one side of which is formed by a metal plate containing a number (seven) of openings, each closed by a heavy lid hinged to an upright lever, so arranged that the lid is raised by the pressing back of the lever by a cam fixed upon a shaft in such wise that only one of the series is in operation at one time. A metal float in the first chamber continually rises and falls by the filling and emptying of that chamber, and by a pawl and ratchet-wheel causes the revolution of the shaft at each discharge of the siphon exactly one-sixth of a circle. Each partial revolution therefore effects the closing by its own weight of the lid which (when held open) received the last discharge, and opens the next lid, so that the discharge then taking place passes through the next outlet in succession. Of the seven openings, one

is commonly not in use, but is so arranged that it can be brought into the series to take the place of any one of the other six which it may be desired to throw temporarily out of work. In this installation each outlet leads to a separate contact-bed. So much for the mechanism. Please note that it is suitable for almost any kind of sewage works, and would be especially valuable in places where broad irrigation is still used, plots of land taking the place of contact-beds. Its use is in no way confined to this particular scheme of works. Further information as to any mechanical details will no doubt be able to be obtained from the makers.

The second point which appeared to me desirable of attainment requires a little more explanation. Although excellent results are obtained by the Dibdin process, equally good are obtained by the Ducat filter. It would thus appear that either aerobic or anaerobic organisms can be made available. My selection has been made upon this assumption, and I have devised a contact-bed which will deal with the intermittent discharges from the distributor without requiring any manual labour such as is required in the Dibdin process for the opening and closing of valves at stated periods. To be brief, I find that sewage will run through a new cinder contact-bed without check for a time; that an over-supply of sewage will ultimately choke the bed, so that nothing at all will pass through; and that between these two extremes there exists the happy mean where the sewage will flow through the bed at exactly such a rate as the operator may wish. By attaining this mean the outlet of the contact-bed may be left permanently open, and yet the sewage will pass through the bed so slowly that it will attain as much purification as if it had been treated by the genuine Dibdin process. My contact-beds are formed of waste cinders, double-riddled so as to retain only those between $\frac{1}{8}$ inch and $\frac{3}{4}$ inch. In this particular instance each contact-bed has a capacity of about 2,000 gallons for sewage in the interstices of the cinders, and as 1,000 gallons only is delivered on to its surface once in every two hours, and gradually percolates through the body of the bed without hindrance, except from the organic matter already deposited there, it must be evident that the upper layers of the bed at all events undergo very thorough aëration. The sewage itself is well aërated at three points in its course—viz., in falling into the siphon-chamber, in discharging into the distributing-chamber, and in being delivered upon the surface of the contact-bed. Thus, the method of treatment in the upper part of the contact-bed exactly follows the original definition of the Massachusetts State Board of Health—viz., "the passage of thin films of liquid over surfaces in

the presence of air." As to what happens in the lower part of the bed, I am not prepared to speak so definitely; but I am quite content to stand upon results. From the chart of analyses by the

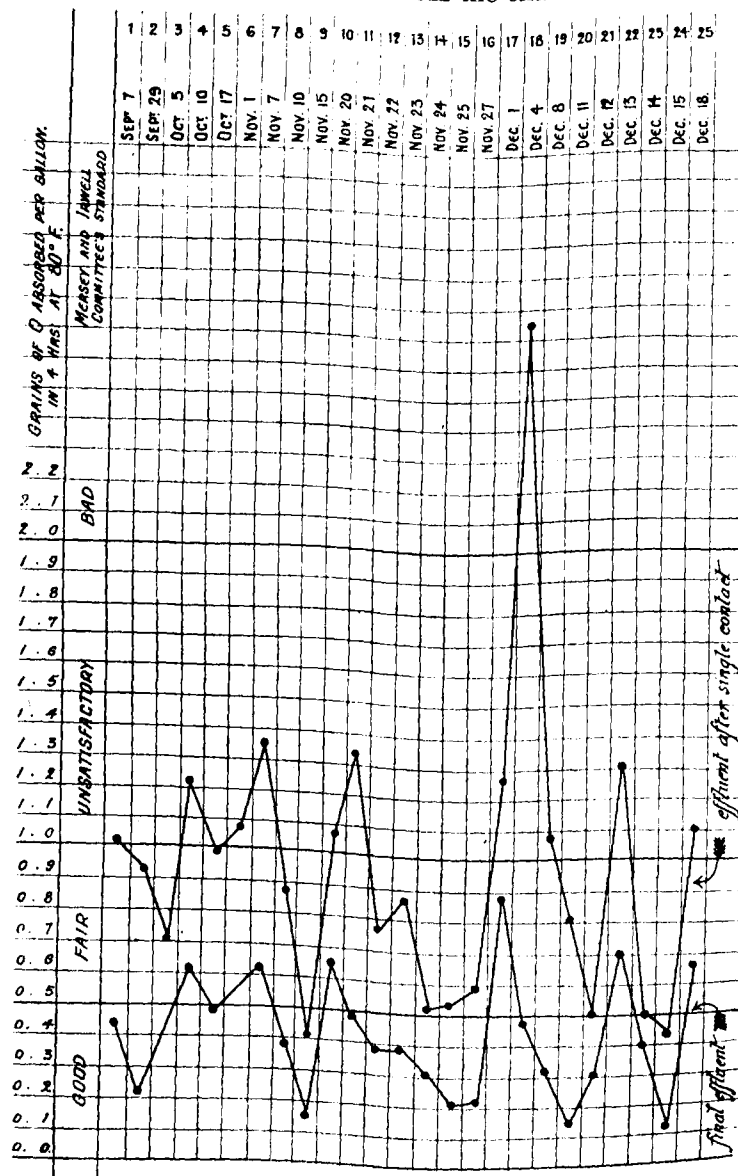


CHART OF TESTS (OXYGEN ABSORPTION) OF SEWAGE EFFLUENTS.

"oxygen-absorption" process, it will be easily seen that we have every reason to be satisfied. With a crude sewage about 4.0 (grains of oxygen absorbed per gallon in four hours at 80° F.),

the effluent (from a single contact-bed) averages 1.0, or less, and the final effluent (after passing over a small area of land) averages only about 0.5, or less.

My diagram is open to criticism on two grounds, viz., that the dates of the analyses are separated by irregular intervals, and that the samples taken on each date may possibly not represent the true average of that day's work. The reply to this is that there is no staff to give continuous attention to the taking of samples, and that I must either go without samples altogether, or be satisfied with such as can be taken haphazard on such days and at such hours as chance to be convenient for the inspector or his assistant to visit the farm when in the neighbourhood on other business. As a matter of fact, I do not myself believe that the diagram is any worse for these circumstances, for it must be admitted that it accurately represents just such sampling as is done in practice by the Mersey and Irwell Joint Committee, and, after all, that is the only standard to which we are compelled to conform. In the diagram every result is given between the first and last dates shown; nothing is omitted, and nothing is "cooked." I think it may be accepted as an honest record of the results normally obtained. I therefore venture to direct attention to it with a certain degree of confidence. On December 4th the only bad result noted was found, and it was afterwards ascertained that the cause of this was the temporary necessity of discharging a small quantity of crude sewage into the channel which normally conveys filtrate only. Omitting that single result, it will be observed that the final effluent out of twenty-two analyses was three times below 0.2, three times again below 0.3, seven times again not exceeding 0.4, and four times not exceeding 0.5, making seventeen times when the effluent was "Good"; whilst none of the remaining five exceeded 0.7, and so were all well within the "Fair" class. This result is sufficiently satisfactory, and yet I am even more proud of the intermediate results given by the effluent after single contact. This stage is not supposed to show anything approximating to a finally good result, yet, as a matter of fact, the diagram shows that this effluent would have been classed four times as "Good," and ten times as "Fair"; whilst on the remaining ten occasions it never reached 1.4, and would therefore have been only moderately "unsatisfactory," even if it had been the final effluent instead of only the intermediate stage. The crude sewage is not shown on the diagram, but its average strength had in earlier experiments been settled to be about 4.0, so that critics are welcome to the admission that the Hale sewage is a particularly mild specimen of the purely

domestic variety. But when all this is allowed for, the results still remain, in my opinion, little short of marvellous, when it is added that during the past twelve months every square yard of this contact-bed has dealt with a minimum quantity of 400 gallons per day, and that on most days this amount has been exceeded, and on some days even doubled. Calculated by the acre, this corresponds roughly to a minimum of 2,000,000 gallons per day, with a larger quantity on most days, occasionally touching a maximum of 4,000,000. The length of time over which the work has been carried on is sufficient to preclude the suspicion that the results obtained have been merely accidental or unreliable. I am not aware of any other system of sewage treatment which makes any pretence to attain such results.

This may be the best place to explain that the works are incomplete. In carrying them out, on account of their experimental nature, it has been necessary to proceed with great caution, and to fully prove each step before taking the next. We have spent two years in arriving at the present position, and more remains to be done to make the works complete. I have invited you to meet to-day, at an earlier date than I would otherwise have liked, for the following reason: After the expiration of this month the greater part of the township of Hale (including the whole area which drains to these works), which has hitherto been a portion of the Bucklow Rural District, will attain to independence as a new urban district. This new district will, of course, appoint new officers, and it is therefore impossible for me to predict what will be done with the sewage works. It is, of course, quite on the cards that my views may not find favour, and that the concrete expression of them may be swept away, so that if I wished you to inspect the peculiar features of my scheme it became necessary to call you together before the end of March, without considering the condition of completeness or incompleteness of the works themselves.

The previous remarks have applied to the older contact-beds. You have also seen a newer and slightly larger set of contact-beds being worked in the same manner, which commenced work on January 30th, 1900. These, therefore, are not yet "ripe," and I say nothing further about them, except to remind you that in this case the sewage passes through a large tank before being distributed; and it is both interesting and important to note the great difference between the crude sewage treated at the old beds, and the tank effluent treated at the new beds. The former contains solid matter in a very crude form, and varies considerably from hour to hour; the latter is of fairly constant strength, and is a liquid containing

only the finest possible particles in suspension. The solid matter has here undergone bacteriolysis in the tank, and I confidently expect to find that a much larger quantity of tank effluent can be treated on a given area of contact-bed than is the case with the crude sewage.

In another set of experiments which I made in a neighbouring district (Knutsford) in the summer of 1898, I demonstrated successfully this bacteriolysis, or destruction of sludge by bacteria, in an open tank.

On September 1st, 1898, I made the following report on "further observations at the sewage outfall-works" to the Knutsford Urban District Council:

"By special permission of the Council, given at the meeting held on July 5th, I was authorized to convert the tanks temporarily into a 'continuous-flow' tank, and observe the results. . . . In estimating results observed, it must be borne in mind that during this period there was no rain, and the sewage was therefore of exceptional strength; also that the weather was unusually hot, so that fermentative and putrefactive changes took place with considerable rapidity. . . . The continuous flow tank gives quite as good a result as the older system, so far as tank effluent is concerned. . . . Another important question was: what would happen to the sludge? When the tanks were run off on July 30th this was answered. Nearly all the sludge was retained in No. 1 tank; some which was found in the other tanks was due merely to imperfect arrangements, and could be almost entirely avoided in any future application of the system. I had the depth of sludge carefully measured; it was 12 inches at the deepest part in the centre. It marked barely 6 inches at the iron gauge at the end, and it was 2 inches along the sides (in No. 1 tank). . . . This shows a much smaller total quantity than would have accumulated under ordinary circumstances."*

The same thing has since been done by several independent observers; but I am not aware at the present moment of any published report on the subject bearing date anterior to mine.

I now come to the third point which I have to explain. In addition to working the contact-beds as described, I carried out another series of experiments by raising the level of the outlets, and draining each bed from its lowest point by a pipe communicating with such outlet. I found in practice that better results could be thus obtained than from the plain open contact-bed. I suppose

* There were three tanks, each holding 97,000 gallons, and the daily flow of sewage was upwards of 150,000 gallons. The "ordinary circumstances" alluded to were: precipitation by large doses of alumino-ferrie, and the removal of sludge mechanically from each tank twice a week, the tanks being worked in succession. The new experiment showed that, with continuous flow, and no chemicals, no mechanical removal of sludge was needed within the twenty-two days over which the experiment extended. Many other allied points had been dealt with in previous reports.

that anaërobic action takes place in the water-logged bottom of the bed, following the aërobic treatment attained in the upper part of the bed; and, without stopping to argue unduly the theoretical rights or wrongs of the matter, I will briefly say that all the beds which you have seen to-day have been constructed upon this principle. But in order not to diminish the space available for aërobic treatment, the beds have been somewhat deepened, so that the space now occupied in the lowest level is below that which was originally designed for the aërobic bed. What now occurs is this: Each discharge placed upon the surface of any given bed forces out in front of it through the rising pipe the previous discharge which has been lying in the bottom of the bed for two hours; and itself, after aërobic treatment in its passage through the body of the bed, lies at rest in the deepest part for another two hours, and is then itself expelled by the next succeeding discharge which comes upon the surface. As I have already said, I am not yet prepared to formulate a complete theory as to the exact action which takes place. I may, however, add this observed fact—that the discharge from such a bed is always faintly opalescent, and generally smells of sulphuretted hydrogen. In spite of this, it always gives a good result with the oxygen-absorption test, and after passing over land it yields a thoroughly satisfactory effluent to the river. The percentage of additional purification obtained by the land treatment is often surprisingly small. I need hardly add that my own wishes would discard the land altogether, and replace it where necessary by further contact-beds.

It only remains to summarize as briefly as possible what you have actually seen. The main sewer delivers upwards of 150,000 gallons per day according to weather, of which not less than 72,000 (and frequently considerably more) is placed upon the older contact-beds, which cover 180 square yards; another quantity, varying from 50,000 to 100,000 gallons, is taken to the new tank and contact-beds. These beds are 240 square yards; but the amount which can be placed upon them is limited by the capacity of the tank, and we are working this cautiously so as not to cause an undue accumulation of sludge. The capacity of the tank is about 50,000 gallons. A third channel remains available for another portion of sewage if necessary. This leads directly, without other treatment, on to a separate portion of the land where broad irrigation takes place. The effluent from this land is always inferior in quality to either of the other effluents from the portions of land containing respectively the old and the new contact-beds. When the flow of sewage exceeds about 350,000 gallons, the surplus passes

direct into the river by means of the original overflow, which exists to-day exactly as it was constructed twenty years ago. To deal more satisfactorily with this overflow is one of the problems which I have had under consideration, but which, owing to the circumstances already detailed, it will probably now fall to somebody else to solve.

Before concluding, I must not omit to draw your attention very strongly to the enormous proportionate amount of sewage with which the older contact-beds have continuously dealt for a period of fifteen months. This has never been less than 400 gallons per square yard per day (or 2,000,000 gallons per acre), and has frequently been more, and occasionally very much more. Had we been content with less, we could undoubtedly have obtained even better results than those I have quoted; but we have been deliberately working the beds up to their very utmost capacity, partly because it was a practical service to deal with as much sewage as possible, but more particularly because we wished to ascertain what such beds could actually perform under pressure. I believe, subject to correction if I am wrong, that there are no sewage works in the kingdom which profess to deal with anything like such quantities as we have successfully treated here (in proportion). Whether our success be due to the automatic distributor, or to the method of working the open contact-bed (in contrast to the Dibdin bed), or to the addition of a lower space wherein some action (not yet fully recognised) takes place, I will not venture to say dogmatically. I will merely remind you that these three features are quite independent of each other, and that, although I have personally preferred to combine them, it is, of course, open to any other experimenter to make use of, or to discard, any one of them at his own discretion.

My remarks have been very greatly compressed, to bring them within the scope of a short paper. If I have left any points insufficiently explained, I will be glad to go into them more fully on another occasion with any inquirer; for I fear that time will not permit of a full reply to-day, and I would much prefer that such time as remains to us should be rather occupied by the criticisms of others than devoted to the repetition of my personal (and perhaps you may think peculiar) opinions.

DISCUSSION.

Dr. HAYWARD thanked Dr. Garstang for his most interesting description of the Hale Sewage Works, and of the work that was being carried on there.

Mr. RUSSELL HALL asked whether sewage should remain standing in the filter for a time, or run straight through?

Mr. GRIMSHAW asked whether better results had been obtained with the beds acting in conjunction with the septic tanks, or with the others? He said the only works which dealt with anything approaching 2,000,000 gallons per acre a day were at Accrington, and there the beds were 9 feet deep and the sewage was warmed. He desired to express his appreciation of the manner in which the automatic apparatus was working.

Dr. YOUNG asked under what circumstances the Local Government Board standard mentioned had been laid down.

Dr. SERGEANT thought that the best principles of sewage treatment had been adopted by Dr. Garstang. He was pleased with the automatic distributor.

Mr. FOWLER (Chemist to the Manchester Sewage Works) said an automatic apparatus for feeding the filters was very desirable, and that at Hale appeared to work well. It, however, required a good fall, so that it might not be suitable for some works. One reason for the efficiency of these beds was that the flow was intermittent, and that the charge was small and frequently repeated. Probably there was a certain amount of anaërobic action at the bottom of these beds. A similar action was noticed in the Manchester experiments. When the discharge-pipes were allowed to remain full, there was after standing a blackish deposit. He thought sufficient attention had not been given to the sanitary aspect of the question, and that it would be very discouraging to the chemist, after solving the problem of disposing of the sewage, to find that the disease-producing organisms had not been rendered harmless.

Dr. GARSTANG replied briefly.

DISINFECTION OF VESSELS.*—The usual methods employed in the Canadian Quarantine Service for the disinfection of vessels are as follows: Steam for all hospital cabins and other small apartments where it can be used; formaldehyde for saloons, state-rooms, and small apartments where the permanent fittings would be destroyed by steam; sulphur dioxide gas, under pressure from the blast furnace, for holds and steerages; and mercuric chloride solution for all free surfaces, alleyways, latrines, bilges, etc. Steam is not suitable for large apartments, as the temperature cannot be kept up, and the steam is therefore precipitated as simple hot water. Last June a ship arrived in the St. Lawrence with 2,300 immigrants from Batoum on board and a crew of sixty-nine. Cases of small-pox existed among both. Every one and the heavy luggage from the hold were landed, the ship disinfected, and a new crew put into her four days later. On this occasion formaldehyde was used for the holds and steerages, being liberated from formalin, 12 ounces of which were allowed for each 1,000 cubic feet of space, with an exposure of eight hours. No further cases occurred subsequently. Formaldehyde has also been employed for the purification of some of the United States transports after service at Cuba.

* From paper read by F. Montizambert, M.D., Director-General of Public Health, before the Canadian Medical Association, August 30th, 1899.—*Montreal Medical Journal*, October, 1899.

BILLS BEFORE PARLIAMENT.

SESSION 1900.

II.

Census Bill.—A summary of the principal provisions of this Bill, as laid before the House, was given in our issue of March last.* The Bill received Royal assent practically without any alteration on the 27th of that month.

Isolation Hospitals Bill.—This was introduced into the House of Lords by the Earl of Lichfield on February 5th last, and has already passed all its stages in that Chamber and been sent to the Commons.

Under the Isolation Hospitals Act, 1893, the area of a local authority who have a sufficient hospital cannot be included in a "hospital district" without the assent of the local authority. The Local Government Board have expressed an opinion that such local authority, although willing to be included in a hospital district, cannot sell or lease an existing hospital to a hospital committee, constituted under the Act of 1893. The Bill will enable, but not compel, local authorities to make over existing hospitals to such a hospital committee.

By the same Act County Councils are empowered to make contributions towards the "structural" or "establishment" expenses of hospitals, but according to the law officers of the Crown this power does not include hospitals provided by local authorities under the Public Health Act, 1875. The Bill will enable contributions to be made alike to hospitals provided under the Public Health Act and those under the Isolation Hospitals Act, 1893. Under existing legislation County Councils can only make contributions out of the county rate, and cannot borrow for the purpose. This practically limits contributions to the annual expenses of hospitals, whereas some County Councils would prefer to contribute, and some local authorities to receive, capital sums towards the original cost. The Bill will enable this to be done, and it will then rest with a County Council to adopt either system of contribution, or both.

Public Health Bill.—This is, we presume, the measure promoted by the Sanitary Inspectors' Association. It aims at the substitution of the title of "sanitary inspector" for "inspector of nuisances," at securing fixity of tenure for all officers, present and future, and at

* See Editorial, p. 381.

requiring proper qualifications in all inspectors to be hereafter appointed. The more important of these provisions were included in the Bill* drafted by the British Medical Association after receiving the views of the Incorporated Society. That Bill was introduced into Parliament on April 27th. A reprint will be found in this issue.†

Water Bill.—This Bill, brought in by Mr. Cornwallis, Colonel Warde, and Mr. Griffith-Boscawen, does not apply to London. It proposes to inflict a penalty on any company supplying "impure or unwholesome water" for domestic use, but fails to define such "water." Every sanitary authority under the Bill is to appoint some officer to inspect the works, reservoirs, etc., belonging to the water company supplying the district, who "on giving not less than six hours' notice to the company," shall have full powers to enter and inspect such works and take such samples as he may deem necessary. Each sample is to be taken in triplicate, and the water company is to be entitled to be represented when the sample is taken. The officer so authorized is to take samples on the written request of any consumer, and in the event of such officer refusing or neglecting to act, there is to be an appeal to the Local Government Board. That Board is also to have the power to appoint an officer to inquire into and report on the quality of the water supplied and the means adopted to prevent pollution of the supply. If the report indicates any default or neglect on the part of the water company, the Board may require the company to do such things or take such steps as may be requisite. Default to comply with such order is to be dealt with under Section 299 of the Public Health Act, 1875. Every company is to be required to have an analysis of the water supplied made monthly, and to send copies of the report thereon to the sanitary authority and the Local Government Board. Except where a special exemption (to be limited to not more than three years) has been granted by the Local Government Board, every company is to properly filter all water supplied for domestic purposes. Every company is to keep a map, to be open to inspection by consumers, of the system of pipes, etc., duly certified by the Local Government Board. No new source of supply is to be tapped without previous consent of the Local Government Board, and any company applying for such license is to give notice to the sanitary authorities of the districts supplied. The Local Government Board

* An account of the Bill as originally drafted, and the amendments suggested for introduction therein, will be found in our issue of September and October last. See PUBLIC HEALTH, xi., p. 757, and xii., p. 1.

† See Supplement.

will then cause an inspection of the new sources to be made, at which inspection the sanitary authorities are to be entitled to be present, and to "make representations and give information." The properly accredited officer of the sanitary authority or of the water company is to be entitled to enter upon any land or premises from which water comes which goes into the public supply, and take samples of any water or "of any matter which may appear likely to cause pollution to the water supplied to the company." Water companies are to be empowered to obtain lands compulsorily for the purpose of adequately securing their supplies against pollution, and the Land Clauses Acts, subject to certain modifications, are to apply. For obstructing or molesting a properly accredited officer a penalty not exceeding £10 is provided.

The Bill appears to us to be a good one, although there are many matters which might be added to it. We desire to see local authorities entrusted with more power over water-supplies vested in companies. There remains, however, the case of supplies belonging to authorities. *Quis custodiet custodem?* The Local Government Board should have more power to act, and be more adequately staffed to enable it to do so.

MEDICAL SUPERVISION OF SCHOOLS.—A report submitted to the Board of Public Education by the Committee on Medical Inspection of Schools of the Public Education Association of Philadelphia, U.S.A., on March 12, 1900, includes the following recommendations:

"1. That schoolhouses already condemned by the Board of Health as unfit for use for school purposes be closed until put in order.

"2. That a maximum rule of forty-five pupils in average daily attendance upon any one school be adopted, at least for all new divisions.

"3. That commencing October 1, 1900, the fitness of the hearing and the sight of all children for school work be annually tested (on a plan specified in the report).

"4. That the use of common drinking-cups be avoided, if possible, by the introduction of a fountain system for drinking purposes, at least in new buildings.

"5. That boiled water be used whenever possible for drinking purposes in schools where adequate filtration is not employed."

Recommendation 2 is intended to limit the number of pupils in a given class or class-room, not in the whole school.—*Philadelphia Medical Journal.*

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

A MEETING of the Society was held at No. 197, High Holborn, London, on Friday, April 6th, 1900. Present: Dr. A. Newsholme (President), in the Chair, Drs. J. Howard Jones, J. Kelland, W. A. Bond, Shirley F. Murphy, Oliver Field, W. Gruggen, J. Groves, W. H. Symons, E. F. Willoughby, H. Beale Collins, H. Kenwood, G. E. Yarrow, L. T. F. Bryett, G. Millson, E. Gwynn, R. Dudfield, G. Newman, A. F. Peskett, H. M. Richards, R. D. Pedley, and F. J. Allan, Members of the Incorporated Society, and Drs. E. W. Goodall and H. E. Hewitt, Visitors.

MINUTES.—The minutes of the last ordinary meeting were read, and having been approved, were signed by the President.

DEATH OF DR. GLAISTER.—The HON. SECRETARY submitted a communication from Mr. Green, of the Vestry of Clerkenwell, announcing the death of Dr. Glaister, a Fellow of the Society.

Resolved the same be referred to the Metropolitan Branch.

PARIS EXHIBITION.—The HON. SECRETARY submitted a communication from the Editor of the *Sanitary Record*, submitting particulars of a suggested trip to Paris under the special sanction of the Paris Municipal Authorities, who have courteously consented to a party visiting the following municipal services among others, viz.: The Night Refuges, Disinfecting Stations, Cattle Markets, Abattoirs, Waterworks, and Sewage Works. It is provisionally proposed to organize an excursion about the end of May. The inclusive charge will be seven guineas.

REPORT OF COUNCIL.—The HON. SECRETARY read the following report of Council:

Your Council beg to report:

1. That they have had before them a communication from Dr. W. H. Kempster, intimating that, in consequence of ill-health, he cannot retain the office of Treasurer of the Incorporated Society of Medical Officers of Health after the present year, and recommend that a record should be placed on the minutes of the Society's proceedings expressing the high appreciation entertained by the Society of Dr. Kempster's services so ably rendered, not only during the six years he has been Treasurer, but also during the many years he has been connected with the Society as a Member of the Council, Auditor, and President of the Metropolitan Branch; and that an illuminated copy of the foregoing resolution be presented to Dr. Kempster, and that the President, and Drs. E. Gwynn and S. R. Lovett be requested to wait upon Dr. Kempster and present the same on behalf of the Society.

2. That they have received the following report from the Parliamentary Committee:

The Parliamentary Committee beg to report:

(a) That they have carefully considered the Census Bill, and have addressed a communication to the President of the Local Government Board and other Members of Parliament, urging the desirability of provision being inserted in the Bill for a further Census being taken in 1906, and also asking that provision may be made for particulars being

furnished with regard to "Wards," in addition to "Counties, Boroughs, and Parishes," as provided in Clause 5 (2); and recommend that their action be approved.

(b) That they have considered the Midwives Bill, and recommend that no action be taken thereon.

(c) That they have considered the Housing of the Working Classes Act (1890) Amendment Bill, and have addressed a communication to the President of the Local Government Board, asking for the insertion of a provision in the Bill to enable Local Authorities to obtain loans upon any housing scheme sanctioned by the Local Government Board, under the Housing of the Working Classes Acts, to be repayable by instalments spread over a period of at least sixty years, and recommend that their action be approved.

(d) That they have considered the Isolation Hospitals (Amendment) Bill, and recommend that the Society should present a petition in favour of the same.

And have adopted Clauses (a), (c) and (d) of the report; but, having regard to the alterations made in the Midwives Bill during its passage through the Standing Committee on Law, they have, at the request of the Parliamentary Committee, referred that Bill back to the Committee for further consideration.

3. That they have unanimously elected the following Officers for the year 1900-1901:

Treasurer	...	...	Dr. E. Gwynn.
Honorary Secretaries	...	{	Dr. F. J. Allan.
		{	Dr. H. Kenwood.
Editor	...	...	Dr. R. Dudfield.
Honorary Solicitor	...	...	Henry C. Jones, Esq.

4. That they have appointed the following Auditors:

Dr. Oliver Field, and
A. G. Warren, Esq., A.C.A.

5. That they have appointed a Special Committee consisting of the President, and Drs. F. J. Allan, R. Dudfield, G. Millson, and J. Mitchell Wilson to consider the question of the classification of death returns, and to draft rules for tabulating causes of death.

6. That they have unanimously passed a vote of thanks to Dr. Tatham for the great trouble he has taken to give effect to the Society's wishes in connection with the question of the classification and certification of diarrhoea deaths.

7. That they have unanimously passed a vote of thanks to George King, Esq., F.I.A., for his valuable assistance and advice in connection with the Fixity of Tenure and Superannuation Bill.*

8. That they have received a communication from the British Medical Association intimating that Dr. Farquharson, M.P., would on Monday, the 9th instant, give notice that he would on the 27th instant ask permission to introduce the Medical Officers of Health and Sanitary Inspectors (Fixity of Tenure and Superannuation) Bill.

9. That they have unanimously accorded a vote of thanks to Dr. Ashby for his services in attending before the Departmental Committee on Milk Standards, and giving evidence on behalf of the Society.

* The Bill is given *in extenso* in the Supplement to this issue.—Ed. PUBLIC HEALTH.

10. That they have decided to hold the Annual Provincial Meeting at Brighton on Saturday, July 7th next.

Resolved on the motion of Dr. GWYNN, seconded by Dr. GROVES, that the Report be received.

THE RETIREMENT OF DR. KEMPSTER.—Dr. GWYNN, in moving the adoption of the Report of the Council, adverted to the recommendation that an illuminated address should be presented to Dr. W. H. Kempster on his retirement from the Treasurership of the Society, and expressed the high appreciation which they all had for Dr. Kempster's work in connection with the Society.

Dr. GROVES, in seconding the motion for the adoption of the Report, endorsed Dr. Gwynn's remarks as to their regard for Dr. Kempster. He also referred to the Fixity of Tenure and Superannuation Bill, and urged all the members to do their utmost to secure its successful passage through the House of Commons.

The PRESIDENT, before putting the motion to the meeting, said Dr. Kempster was esteemed by them all. They had looked to him for many years for advice and help. Personally he felt a deep debt of gratitude to him because, when he was quite a junior medical officer of health, it was Dr. Kempster who taught him how to tabulate death returns and prepare an annual report, and he had been a good friend to him ever since. He had been a good friend and valued helper to the Society as a whole, and they were all deeply sorry that in consequence of the state of his health his active connection with the Society was about to be determined.

The motion was carried unanimously. The President and Hon. Secretaries were authorized to sign the address on behalf of the Society.

ELECTION OF PRESIDENT.—The Society then proceeded to elect a President for the year 1900-1901.

The HON. SECRETARY reported that John C. McVail, M.D., D.P.H., F.R.S.E., of 24, George Square, Glasgow, had been duly nominated by Dr. J. Dixon, and seconded by Dr. Oliver Field; and had also been nominated by Drs. W. A. Bond, L. T. F. Bryett, Sidney Davies, Reginald Dudfield, A. Bostock Hill, and Herbert Manley, and that no other Fellow had been nominated.

A ballot was then taken, and the President declared Dr. J. C. McVail unanimously elected.

(The President-Elect will come into Office on the first day of next Session, i.e., October 1st.)

ELECTION OF MEMBERS.—The following candidates having been duly nominated for election, a ballot was taken, and they were declared by the President to be unanimously elected:

AS FELLOWS.

Cranstoun, Charles Bruce, M.B., M.R.C.S., 15, Broad Street, Ludlow, Salop, M.O.H. Ludlow.

Murison, Patrick, M.B. and C.M. Edin., L.R.C.P. Lond., D.P.H. Golspie, N.B., M.O.H. Sutherlandshire.

Poole, Arthur Henry, L.R.C.P. and S. Edin., 4, Market Street, Tottington, Bury.

Ransome, A. Sidney, B.A., M.B., B.C., D.P.H. Cambs., Palmers Green, N., M.O.H. Southgate U.D.C.

AS AN ASSOCIATE.

Cave, James, 10, Calverley Parade, Tunbridge Wells.

NOMINATIONS.—A number of candidates were nominated for election at the next ordinary meeting.

VITAL STATISTICS TABULATION.—Dr. REGINALD DUDFIELD gave a demonstration of a simple method of classification and tabulation suitable for all forms of vital statistics.

On the motion of Dr. GWYNN, seconded by Dr. ALLAN, a vote of thanks was accorded to Dr. Dudfield for his interesting demonstration.

A paper was then read by Dr. E. W. GOODALL, Medical Superintendent of the Eastern (M.A.B.) Hospital, on "Fever Hospital Administration and its Difficulties."*

At the close of the paper a discussion took place, in which the President, Dr. H. Beale Collins, Dr. W. G. Willoughby, Dr. H. Meredith Richards, Dr. E. Gwynn, Dr. G. Millson, Dr. W. A. Bond, Dr. H. Kenwood, Dr. Oliver Field, Dr. F. J. Allan, and Dr. J. Howard Jones took part.

On the motion of the PRESIDENT, a cordial vote of thanks was accorded to Dr. Goodall for his paper.

BIRMINGHAM AND MIDLAND BRANCH.—A meeting of the Branch was held at the Council House, Birmingham, on Thursday, April 5th, 1900.

Members present: Dr. Mabyn Read (President) in the Chair, Drs. Marsh-Jackson, Millard, Gepp, Underhill, Snell, Richmond, D'Arcy Ellis, Malet, and Manley.

Apologies were received from Drs. Bailey and Meredith Richards.

Dr. MANLEY opened a discussion upon the present unsatisfactory state of the law relating to unsound meat and its administration. After briefly recapitulating the sections of the Public Health Act, 1875, he summarized the recent decisions in the cases arising at Brighouse, at Birkenhead, and in the Rhondda Valley. The leading points which he presented for debate were as follows:

1. What constitutes a proper seizure?

In this connection he pointed out the necessity for being satisfied that the possessor of the meat at the time of seizure was liable for it, and the care to be taken that no other persons were allowed access to the seized meat.

2. The need for some skilled opinion beyond that of the sanitary inspector and medical officer—viz., a veterinary surgeon.

3. The advisability of not making the condemnation of the meat by a magistrate a purely *ex parte* proceeding, but permitting the owner to call other evidence to rebut the contention of the sanitary officer.

4. The legality of the proceedings taken in the cases mentioned of calling a mass of evidence from people who did not see the meat in question.

5. The advantages or otherwise to be derived from the institution of a butchers' jury.

All these points were discussed at considerable length, and the speaker concluded by relating a personal experience of a case which had been recently lost by his authority under what he considered unjust circumstances.

Dr. MARSH-JACKSON (Smethwick) related some personal experience as to the employment of police officers as assistants in meat cases, and was inclined to think that the butchers' jury was of but little value. He found it best to use a proper form for the condemnation by a magistrate, which he believed was published by Knight and Co.

* Will appear in our next issue.

Dr. UNDERHILL (Tipton) had received great assistance from the appointment in his district of a retired butcher, who had not in the past been wholly free from suspicion. This man received a fee of 10s. 6d. per case from the District Council, and did his work exceedingly well. Unfortunately he was recently deceased.

Dr. D'ARCY ELLIS (Brierley Hill) agreed with the last speaker, with whom he had been associated in a case. He felt very strongly that the proceedings for condemnation should not be *ex parte*.

Dr. MALET (Wolverhampton) saw no value in the establishment of a butchers' jury except in so far as it pleased the trade. After all, was a butcher the best judge of unsoundness? They must remember that some very first quality meat might be unsound, while, on the other hand, poor meat was not of necessity diseased. With regard to prosecution, he thought that it should only follow in cases of *mala fides*. The place of seizure seemed to him of great importance, as it was often only possible to seize meat while still in transit, and he usually did so at the railway-station. It must be remembered that voluntary surrender did not constitute legal seizure, and he always made a practice in cases of voluntary surrender of obtaining a written consent to the removal and destruction of the meat. The only claim for damages in his experience was where the magistrate refused to condemn, and the meat was returned to the vendor, who sent in a claim to the committee, but it was not pressed.

Dr. SNELL (Coventry) strongly objected to *ex parte* procedure. In the new Coventry Bill now before the House of Commons, it was proposed to give the butcher a statutory right to appear on such an occasion, and to produce rebutting evidence if he so wished. They further sought powers to proceed against the owner, depositor, or the original vendor of the carcase.

Dr. MANLEY briefly summed up the discussion, and moved the following resolution:

That the Council of the Society of Medical Officers of Health be requested to take into consideration at an early date the present difficulties attending the seizure of apparently unsound meat with a view to such amendment or alteration of the law as may appear to them advisable, and for the better protection of sanitary officers in the inspection of meat.

Northern Branch.—An ordinary meeting of this Branch was held on Friday, March 30th, 1900, at Dr. Armstrong's office, Newcastle-upon-Tyne.

There were present: Drs. Armstrong (in the Chair), Taylor, Gofton, Horner, Dingle, Arthur Morison, Green, Boustead, and Jackson.

The minutes of the last meeting were read and confirmed, and also those of the last annual meeting.

A discussion on the power of compulsory removal to hospital of cases of infectious disease was introduced by Dr. Taylor, and carried on by Drs. Armstrong, Boustead, Gofton, Horne, Dingle, Morison, and Green.

A discussion as to the regulation of the sale of milk from cows deposited for sale at auction marts was introduced by Dr. Green, and continued by Drs. Armstrong, Jackson, Boustead, and Taylor.

The question of the provision, free of charge, by the sanitary authority of supplies of antitoxin, and of the means for bacteriological diagnosis, was discussed by Drs. Morison, Armstrong, Taylor, Dingle, and Jackson.

The following resolution was moved by Dr. ARMSTRONG, seconded by Dr. TAYLOR, and carried:

That in the opinion of this Branch it is desirable that medical officers of health should have discretionary powers from their sanitary authorities to have bacteriological examinations made in doubtful or suspected cases of diphtheria.

The question of the notification of erysipelas was discussed by Drs. Armstrong, Taylor, and Morison, and a resolution on the subject was adjourned till the next meeting.

North-Western Branch.—The ordinary monthly meeting of this Branch was held at the rooms of the Chemical Club, Manchester, on Friday, April 20th.

The following members were present: Drs. Hayward (President) in the Chair, and Drs. Berry, Edlin, Garstang, Guest Gornall, Graham, Harris, Niven, Pilkington, Robertson, Sergeant, and Wheatley.

The minutes of the last meeting were read and confirmed.

After some discussion it was proposed and carried that not less than three meetings each year be held at places other than Manchester.

Dr. POOLE, who was nominated at the last meeting, was duly elected a member.

Dr. GORNALL read a paper entitled "A Note on the Sanitary Condition of Warrington a Hundred Years Ago."*

A discussion followed, in which Drs. Nivens, Garstang, Wheatley, Sergeant, Robertson, and Hayward took part.

Yorkshire Branch.—A meeting of the Branch was held in the Town Hall, Huddersfield, on Friday, March 30th, 1900.

There were present: Drs. Fairclough (Mirfield), President; Cameron (Leeds); Hicks (Easingwold); Thorp (Todmorden); Lawson (Hebden Bridge); Ainley (Halifax); Deville (Wakefield); Jackson (Denholme); Hunter (Pudsey); Annis (Huddersfield); Green (Meltham); Hoyle (Ripponden); Brown (Greetland); Storr (Halifax R.); Mitchell Wilson (Doncaster); Wellburn (Sowerby Bridge); Burman (Wath-on-Dearne); Greenwood (Ossett); Kaye (Wakefield), Hon. Secretary; and two visitors—Dr. Whitcombe and Mr. Travis.

The ordinary business of the meeting having been disposed of, the adjourned discussion on the two following papers was resumed: "Diphtheria in Rural Districts," by Dr. C. B. HICKS; and "Diphtheria Experience at Keighley," by Dr. W. SCATTERTY.†

West of England and South Wales Branch.—A meeting of the Branch was held on February 8th, 1900, at the Town Hall, Trowbridge.

Present: Drs. Symons, Tubb Thomas, J. Howard Jones, Mulville Thompson, Drake, Heaven.

The minutes of the last meeting were read and confirmed.

A discussion on "The Issue of a Complete Weekly List of Notifiable Diseases by the Local Government Board" was opened by Dr. TUBB THOMAS.

Dr. J. HOWARD JONES then read a paper on the subject of "Inter-notification." All the members present took part in the discussion.

At the close of the discussion the following resolutions were adopted,

* Will appear in a future issue.

† A report of the discussion will appear in our next issue.

and the Secretary was requested to submit them to the Council of the Incorporated Society for consideration:

1. That in the opinion of this Branch it should be compulsory for every Local Authority to make to some central authority a weekly return of all cases of infectious disease notified.
2. That in the opinion of this Branch it is desirable that a complete registration of cases of infectious disease notified throughout the country should be made by some central authority.
3. That in the opinion of this Branch a copy of such register should be supplied to all medical officers of health weekly.

A meeting of the Branch was held on April 12th, 1900, at the Alt-yr-Yn Isolation Hospital, Newport, Monmouthshire.

Present: Drs. Symons, Tubb Thomas, J. Howard Jones, Ebenezer Davies, Herbert Jones, and Heaven.

The minutes of the last meeting were read and confirmed.

A letter was read from the Secretary of the Incorporated Society acknowledging the receipt of copies of the resolutions passed at the last meeting.

Dr. J. HOWARD JONES then brought forward the question of the desirability of supplying diphtheria antitoxin gratis to medical practitioners.

After discussion, the following resolution was proposed by Dr. J. HOWARD JONES, seconded by Dr. HERBERT JONES, and carried *nem. con.*:

That in the opinion of this Branch medical officers of health should advise their authorities to supply diphtheria antitoxin gratuitously for any case where its use may be required, and that the Council of the Society be asked to obtain the opinion of the other branches on the matter.

It was mentioned that the Council of the Incorporated Society was considering the advantage of certain alterations in the Society's tables for annual reports.

An informal discussion on the point ensued, but no resolution was passed.

Southern Branch.—A meeting of the Branch was held at Haywards Heath, Sussex, on Wednesday, April 18th, at the District Council's Offices.

There were present: Dr. Kelly (President), Drs. Sturgess Jones, Newsholme, Nash, Stott, Griffiths, and Willoughby.

The minutes of the previous meeting were read and confirmed.

Dr. KELLY submitted his diagrams of the surface-water levels and earth temperatures, which the Secretary was instructed to send on to the Editor of PUBLIC HEALTH.

Dr. STOTT read a paper on "Some Local Methods of Sewage Disposal,"* after which the members present drove to the Haywards Heath Sewage Disposal Works (Dibdin's System), and then to the Balcombe Waterworks, where the method of eliminating the iron from the water was shown.

Dr. Stott was thanked for his paper.

It was decided to hold the next meeting at Emsworth, on a date suitable to Dr. Lockhart Stevens, the Medical Officer of Health.

* Will appear in a future issue.

THE DISTRIBUTION AND CONTROL OF EPIDEMIC MEASLES.*

By THOMAS ROBINSON, M.R.C.S., D.P.H.

Medical Officer of Health of County of Leicester.

Dr. ROBINSON'S paper was based on an experience of over 2,000 cases which occurred during an epidemic at Burton-on-Trent in 1898, when he was Medical Officer of Health of the Borough. The estimated population at that date was 51,664, mostly artisans and brewery employes, occupying houses containing from four to six rooms. Measles had been scheduled in the Notification Act since 1893, and in the course of the six following years there had been three biennial epidemics. The average annual number of deaths and the mean death-rates from measles in the successive quinquennia since 1889 had been 16, 18, and 32 deaths, giving rates of 0.37, 0.39, and 0.64 per 1,000, the higher figures in the last period being wholly due to the excessive mortality in the epidemic of 1896. The average annual number of notifications in the last five years was 1,360, but in 1898, with which he was now concerned, it rose to 2,048, with 31 deaths, equal to a case fatality of 1.5 per cent., and a death-rate of 0.60; the notifications represented probably 95 per cent. of the cases. The ratio of the children under school age (babies) to those in infant schools (infants) attacked, was as 80 to 100. He traced the outbreak to a tea meeting and entertainment, and it was remarkable that two infants were attacked whose mothers had been to the meeting, but had left them at home. At a later period two Sunday-schools evidently contributed to the spread of the disease in their districts. Of the "babies" constituting the first cases in their respective houses, 26 per cent. were in houses next door to which cases had already occurred: 11.5 per cent. were two doors, and 5.5 per cent. three or four doors removed from such foci of infection. The general conclusions to be drawn from a study of this epidemic were:

1. That measles introduced into a district through infant, Sunday or day schools, spread with a rapidity and to an extent inversely proportionate to the previous frequency of epidemics in the district, unless early and prompt closure of the schools were enforced;
2. When introduced into a district by means of isolated cases, it did not spread to any extent until the infant schools became infected;
3. That Sunday-schools played an important part in spreading the disease;
4. That "babies" might under certain circumstances be attacked before, but that the great majority were attacked after the invasion of the schools;
5. That house-to-house infection was a serious danger to "babies," the greater the proximity of the infected house.

As regards control, the closure of a day or Sunday-school so soon as it was found to be infected, *i.e.*, within three days, was the only effectual check, and it was noticed that while in districts where the

* Abstract of a paper read before the Epidemiological Society, March, 1900.

outbreaks had recurred biennially, the incidence was almost confined to the infant departments, in those in which there had been no epidemic for six or more years the boys and girls were attacked in proportion of from 10 to 20 per cent. He concluded therefore:

1. That as hitherto practised, closure was nearly always enforced too late;
2. That the closure, if carried out before the infant schools had been infected, would be of great benefit not only to the infants but to the "babies";
3. That where biennial epidemics had prevailed, the infant schools only need be closed;
4. That the sanitary authority should be empowered to close Sunday-schools under similar circumstances;
5. The temporary closure of any school, even for a few days only, might be the means of averting a threatened epidemic.

Compulsory notification was obviously the best means of obtaining information, but it should be supplemented by others, and the people should be educated so that the plea of ignorance of the nature of the infectious disease should no longer be admitted. The case fatality in notifying towns varied between 2.5 and 5.0 per cent., being often lowest in epidemic years, possibly as a result of notification. The paper was illustrated by numerous statistical tables and diagrams and a map.

Dr. R. DUDFIELD said that in the absence of compulsory notification he obtained much information from school teachers, given voluntarily, but it was not available during the holidays, nor for children not attending public schools. He attached much importance to disinfection ten days, if possible, after an attack. If the inspector, calling a fortnight after disinfection, found that there had been no fresh cases, the children were allowed to return to school. A high school working on rules requiring six weeks' exclusion of all children attacked, was the only one in his district that was not compelled to close during a recent epidemic.

Mr. SHIRLEY MURPHY said Mr. Robinson's statistics were very instructive, but he should like to know whether they were based on notified cases only, or on other additional information. The evidence of the positive advantages of notification must be very clear before one could advise its adoption in London. It was not the cost of the notification so much as that involved in the additional inspection, disinfection, etc., that had to be reckoned with.

Dr. NEWSHOLME thought that the Local Government Board might take up the closure of Sunday-schools, and the medical officer of health should protest against school treats at such times, as stultifying the closure of the school. For statistical investigation it was much to be wished that the children who had had measles, and were therefore insusceptible, should be distinguished from the susceptible, on whom alone the incidence should be calculated; he had done this to a great extent in the case of scarlet fever in the Brighton schools. The mortality from measles being almost confined to children under five years, he thought that their attendance at school might be prohibited with advantage.

Dr. BOND remarked that in London the deaths from measles exceeded those from scarlet fever, enteric fever, and certain other infectious diseases, put together. In many cases a complication, as broncho-pneumonia, was returned as the primary cause of death, instead of as a secondary. Compulsory notification by the parents

would have a great educational value, and tend to secure honest efforts towards the isolation of the children instead of reckless exposure.

The PRESIDENT remarked on the advantage of physical boundaries as railways or rivers over arbitrary divisions, and on the evidence adduced of the conveyance of infection by third parties, and the value of disinfection. He would, however, point out that the Local Government Board had no power over Sunday-schools, and was able to enforce the closure of day-schools only by the co-operation of the Education Department, which refused the grant to schools failing to comply with the orders of the sanitary authority.

Dr. ROBINSON, replying, ascribed the apparently higher case mortality found by Dr. Dudfield to the incompleteness of the returns obtained from school teachers. He disinfected the houses with formalin, and clothing, etc., by steam, unless the cases were too numerous for his staff to cope with. The inspectors always called at adjacent houses, threatening proceedings if the Act were not complied with.

AN AUSTRALIAN APPOINTMENT.—At the meeting of the Adelaide Local Board of Health on February 12th last Dr. Thomas Borthwick, whose name is well and favourably known in connection with health and sanitary matters, was appointed Medical Officer for the City of Adelaide at a salary of £225 per annum. Dr. Borthwick, who was the only applicant for the position, was at the time of his appointment Medical Officer of Health to the East Torrens County Board of Health, Lecturer on Bacteriology to the University of Adelaide, Hon. Bacteriologist to the Adelaide Children's Hospital, Director of the Elder Bacteriological Laboratory, Vice-President of the Institute of Hygiene and Bacteriology, Fellow of the Royal Institute of Public Health, London, member of the Epidemiological Society, London, Fellow of the Incorporated Society of Medical Officers of Health, England, late Examiner in Hygiene, University of Adelaide, etc. The new city health officer will be allowed private practice, but in his public capacity will, in all probability, have to devote his attention solely to the city work.—*Australian Register*.

[Salaries do not appear to stand any better in South Australia than they do in England.—ED. P. H.]

MEETINGS FOR MAY.

May 11th, North-Western Branch, at Manchester.
 May 18th, Metropolitan Branch, at London.
 May 19th, Scottish Branch, at Edinburgh.
 May 25th, Northern Branch, at Newcastle-upon-Tyne.

ANNUAL PROVINCIAL MEETING.

This meeting of the Incorporated Society will this year be held at Brighton on Saturday, July 7th.

THE MANUFACTURE AND ADULTERATION OF SAUSAGES.*

THE methods employed in the manufacture of sausages have always been such that a considerable amount of supervision by the authorities has been deemed necessary. Where inspection and supervision have been lax, animals whose flesh is not fit to eat are killed for food, and if the meat be too bad to be sold in the ordinary way, it is not improbable that in many instances it is worked up into sausages.

Sausages may be adulterated in various ways:

- (1) By the addition of antiseptic substances, of preservative salts in excess, or of colouring matters;
- (2) By the addition of starch, flour, rice-flour, and breadcrumb;
- (3) By the use of flesh of animals which have died naturally or have been slaughtered on account of disease;
- (4) By the use of parts of animals not usually eaten (as the hides of oxen);
- (5) By the use of the flesh of such animals as the dog, cat, horse.

Where ordinary salt is used in excess, it is not difficult to determine its presence, as is also the case where borax or sulphites are employed. Formalin is more difficult to detect, and in order to do so it must be distilled off in the presence of sulphate of soda, when its presence may be detected in the distillate by its reactions.†

Checallier and Baudrimont have recorded instances‡ in which large quantities of a flour-paste coloured with fuchsine have been added to sausage-meat. The starch-cells are as easily detected as the fuchsine which colours them. Cochineal has sometimes been employed, and Kellermann has noted the use of saffron where the sausage-meat has been insufficiently smoked.

The addition of various forms of flour is without danger to the consumer, and is highly remunerative to the manufacturer. Small quantities are necessary, but when it comes to 10, 20, or even 30 per cent. of the whole, it should be regarded as an adulteration. Cooked Bologna sausages, with or without garlic, are frequently adulterated in this way, and can thus be made to absorb much water.

The adulteration of sausages by the use of unsound meat is of much greater danger to the public health. In order to remove the bad flavour such meat is boiled, and the scum removed. It is then minced and pounded up with spices, and sometimes smoked in order to disguise the sharpness of flavour which is to be found in sausages so made. Some manufacturers, according to recent receipts, have adopted methods whereby toxic substances must necessarily be produced. In such cases detection of the fraud is often difficult, unless the process of manufacture has been seen.

Horse-flesh is not an unknown constituent of sausages. In the north of France the author knows that a conscientious knacker refused a good price from a Belgian firm for the bodies of animals killed in his establishment. In Brussels Bologna sausages have been made of the flesh of horses which have died from disease. A similar statement has

* Abstract of an article by M. H. Martel, Veterinary Sanitary Officer of the Department of the Seine, *La Presse Médicale*, January 24th, 1900.

† F. Jean, "L'Hygiène Moderne," 1899.

‡ "Dictionnaire des Falsifications."

been made by the food inspectors of Rheims. Nocard reported in 1895 that measles pigs were killed in certain suburbs, and brought into Paris in the form of sausage-meat, in which it is almost impossible to detect the hooklets from the head of the *Cysticercus cellulosæ*.

Tuberculous meat has been used in a similar way, but in a case recorded by Lignières* the bacilli as tested in guinea-pigs had lost their virulence during the process of cooking.

In Germany cases have occurred frequently in which trichinosis has resulted from eating sausages. The possible existence of the trichina in dogs† may constitute a real danger in places such as Munich, where dog-flesh is put into sausages (Ostertag).

The hides of oxen are stated by Henniger‡ to be frequently used in the Grand Duchy of Baden in the manufacture of *Lahr* sausages (*Hautwurst*), in which the larvæ of insects, tubercular bacilli, pus microbes, and such-like have been found. In Paris during recent years sausages have been made from the muscular coat of the œsophagus of oxen. It seems desirable that when inferior food of this description is sold, notice should be given indicating the nature of the article.

Bascou is responsible for the statement that dogs' flesh is sold in Paris for mutton, and it is therefore not unlikely that it is also made into sausages. Horse-flesh is undoubtedly often substituted for beef and pork in sausages. The greater part of the 22,000 horses slaughtered each year in Paris in the abattoirs of Villejuif and Pantin are very lean animals, whose flesh can only serve for sausage-making, or for the falsification of other products, the true nature of which can be disguised. Such lean horse-flesh lends itself admirably to this kind of fraud, as horse-fat has, when present, a tendency to exude, and would draw attention to the fraud. When a sausage is made exclusively of horse-flesh it is easy to recognise it. It is firm, very compact, elastic like a piece of caoutchouc, and highly-coloured a reddish brown. On being cooked gently, it yields a pale, slightly oily soup, smelling more or less of the aromatic substances which have been added. When horse-flesh is mixed with other meat it is more difficult to distinguish. Microscopical examination gives no assistance, contrary to the assertions of some writers. Nor does the estimation of the melting-point of the fat give a positive result, as the manufacturers are careful not to use horse-flesh rich in fat, but add pork-fat to the sausage. Ostertag holds that no scientific value is to be attributed to the test of pounding the sausage-meat with sulphuric acid in order to compare the shade of gray produced. The presence of glycogen, which is very abundant in the tissues of the horse, may enable its flesh to be detected even when mixed with other meat; but this test cannot be relied upon to calculate the exact amount present, although Niebel was of opinion that it might be done. The test is rendered more difficult to carry out when starch is present, especially with the iodine test. Various methods have been tried to overcome this difficulty, but the most satisfactory appears to be to eliminate the starch by filtering a solution through a layer of fine sand of a thickness proportionate to the amount of liquid, to which has first been added a few drops of a solution of iodine and calcium chloride. The starch which has fixed the iodine is precipitated by the calcium salt, and the filtrate gives the reaction for glycogen if the sausage has been recently made and contains horseflesh. Small quantities of glycogen are sometimes present in beef and veal, so that

* *Bull. de la Soc. Cent. de Méd. Vet.*, 1898.

† *Pfl. Zeitschr. f. Fleisch u. Milchhygiene*, 1899.

‡ *Idem*, 1896.

the test can only be of value if it shows large quantities present. Attempts have been made to isolate other principles peculiar to the horse, but the physical properties of the sausage must be largely considered in connection with any chemical analysis which may be made.

REVIEW OF RECENT BACTERIOLOGY.

BACTERIAL TREATMENT OF SEWAGE ON COKE-BEDS.—In the course of the experiments carried out by Dr. Clowes at Crossness with a view of determining the adaptability of the method for dealing with London sewage,* it was found that the sewage capacity of a coke-bed gradually decreased with use. This progressive decrease, caused by the deposition on the coke of a sediment consisting of sand, cotton and woollen fibre, diatoms, straw, chaff, and woody fibre, is an important factor which has to be taken into consideration in connection with the adoption of any such system of sewage disposal for a large city. The material, consisting as it does largely of cellulose with more or less inorganic matter, does not appear to be acted on in any way by the bacteria living in the coke-beds. Further experiments† have been made in order to ascertain whether this material, which caused a decrease in the sewage capacity at the rate of 1 per cent. of the original capacity of the beds per week, could be separated by sedimentation without separating with it the putrescible constituents of the crude sewage. By allowing a rapid sedimentation in a tank before the sewage is passed over the coke-beds, it is found that some of the waterlogged cellulose matter can be thus removed, and the progressive choking up of the bed reduced to 0·64 per cent. of the original capacity per week. The sediment in the settling-tank is quite inoffensive, whether kept in a moist or dry condition; when dried it burns readily, and can be easily dealt with in a furnace or destructor. It is obvious, however, that even with this preliminary sedimentation the life of the coke-bed will be a comparatively short one.

THE PRESENCE OF "ACID-FAST" BACILLI IN LONDON SEWAGE.—Examination of the material which causes the choking up of the coke-beds showed the presence of a large number of so-called "acid-fast" bacteria which resembled *Bacillus tuberculosis*, in the fact that after a staining with hot carbol fuchsin they resisted the decolourising action of a 33 per cent. nitric acid solution.‡ Some of these bacteria, which appeared as small, thin, curved, beaded rods, also resembled *Bacillus tuberculosis* morphologically; whilst others were shorter and plumper. Such bacteria were found in the crude sewage and in the effluent, as well as on the coke-beds at both Barking and Crossness; but none of the guinea-pigs inoculated from these sources developed true tuberculosis. A similar deposit obtained from a coke-bed elsewhere which had been treated with sewage for a considerable time, also contained a number of these "acid-fast" bacteria, and a guinea-pig inoculated with

* See *Review of Recent Bacteriology*, PUBLIC HEALTH, vol. xii., p. 52 (October, 1899).

† *Bacterial Treatment of Crude Sewage* (Supplement to Second Report), London County Council, No. 458, 1899.

‡ *Idem*.

it died with tuberculosis of the bronchial glands, spleen, and other organs, in which numerous tubercle bacilli were found.

NITRIFICATION BY BACTERIA.—Professor Warington has read an interesting paper before the Chemical Society on "Recent Researches on Nitrification."* The process of nitrification is carried out by two distinct organisms: the first (the nitrous organism) converts the ammonia into a nitrite; the second (the nitric organism) causes the oxidation of the nitrite, with the formation of a nitrate. These organisms will not grow on gelatin or on most of the ordinary organic bacteriological culture media. The latest method of isolating the nitrous organism from soil is by means of magnesia-gypsum plates saturated with a solution containing an ammonium salt and the ash constituents of plant-food. For the isolation of the nitric organism a solution containing sodium nitrite and ash constituents is used. Winogradsky has shown that both the nitrous and nitric organisms derive their carbon directly from carbonic acid. The same authority, after examining soils from different parts of the world, has found but one nitrous and one nitric organism in any one sample of soil. The nitric organism is always of the same species; the nitrous organism may vary. Warington concludes that the nitrifying organisms have no action upon nitrogenous organic matter. The organic matter must first be decomposed by other bacteria with the production of ammonia before the special nitrifying organisms come into play.

THE VALUE OF THE SERUM-TEST IN THE DIAGNOSIS OF EQUINE GLANDERS.—The value of the serum-test in glanders has from the first been questioned, and the matter has lately been thoroughly investigated by Bourges and Méry.† The serum of thirty horses which after slaughtering showed no signs of glanders was tested, and it was found that as a rule their blood in a dilution of 1:200 caused an agglutinative reaction with a culture of the bacillus of glanders, whilst in exceptional cases the reaction occurred with a dilution of 1:300, 1:400, or even 1:700. In glandered horses, on the other hand, it was found that the test might fail with a dilution of 1:200, but was usually obtained with a dilution of 1:300 or 1:500, and occasionally with a dilution of 1:1,000. The authors conclude, from the results of many experiments, that the fact of agglutination being only obtained with a dilution of 1:300 does not necessarily imply that the horse is not glandered, and that if the reaction occurs with a dilution of 1:300, or over, the presumption is that the horse is infected; but even then there is no certainty. In short, it is quite clear that the serum-test is far inferior to the mallein-test for the diagnosis of glanders in horses.

THE INFECTIVITY OF THE MILK OF TUBERCULOUS WOMEN.—Roger and Garnier have recorded a case‡ suggesting that, in spite of the observations of Escherich, Fede, Bonis, and Bang to the contrary, the milk of a tuberculous mother may be a source of infection for the child. The patient, aged 34, died seventeen days after her confinement, and advanced tubercular disease of the lungs was found. Four days after the confinement two guinea-pigs had been inoculated with her milk. One of them died with well-marked tubercular infection, whilst the other, which had received a smaller dose of the milk, survived. The child was apparently healthy at birth, but lost weight afterwards, and

* *Proceedings of the Chemical Society*, vol. xvi., No. 221, 22nd March, 1900.

† *Archives de Médecine Expérimentale et d'Anatomie Pathologique*, 1^{re} Série, tome xii., No. 2, 1900.

‡ *Comptes Rendus de la Société de Biologie*, tome lii., No. 8, 2 Mars, 1900.

died when six months old with tubercular lesions of the mesenteric glands, liver, spleen, and kidneys, in which the tubercle bacillus was found.

BACILLUS TUBERCULOSIS IN BUTTER.—Ascher* tested twenty-two samples of butter for *Bacillus tuberculosis* by means of guinea-pig inoculations, and identified the bacillus in two samples out of that number. The other "acid-fast" bacilli resembling *Bacillus tuberculosis*, which had been described by Petri as occurring in butter, were not found in any of the samples.

LAW REPORTS.

HIGH COURT OF JUSTICE.

CHANCERY DIVISION.

BEFORE MR. JUSTICE BYRNE.

EASTWOOD BROTHERS (LIMITED) v. THE HONLEY URBAN DISTRICT COUNCIL.

THIS was an action for an injunction to restrain the defendants, the Honley Urban District Council, from cutting off the connexion between the drain which receives the liquids proceeding from the plaintiffs' mills, and the manufacturing processes carried on there, and the sewer adjacent to the mills. The plaintiff company carries on business as woollen and worsted manufacturers at Thirstin Mills, at Honley, near Huddersfield.

Mr. Levett, Q.C., and Mr. Waggett appeared for the plaintiffs; Mr. Asquith, Q.C., and Mr. E. Clayton for the defendants.

MR. JUSTICE BYRNE, in giving judgment, said: The plaintiffs' predecessors in the title had a right to cause their drain to empty into the sewer of the local authority now vested in the defendant District Council—see *Ainley v. The Kirkheaton Local Board*, 60 L.J., Ch. 734, and *Brown v. The Mayor of Dunstable*, 1899, 2 Ch., 378—and the plaintiffs have a right to continue so to cause their drain to empty into the same sewer under Section 21 of the Public Health Act, 1875. Having regard to the circumstances under which the connexion of the plaintiffs' drain with the defendants' sewer was originally made, and to the length of time during which the state of things so initiated has continued, I am of opinion that I ought to hold, as I do, that the connexion was duly and lawfully made. The plaintiffs' predecessors were and they now are entitled to empty through their drain into the sewer in question, not merely sewage matter, but manufacturing effluents—see *Peebles v. Oswaldtwistle Urban District Council*, 1897, 1 Q.B., 384, which was reversed, but not on any point material to the present case. Under these circumstances the plaintiffs are in my judgment entitled to an injunction to restrain the defendants from cutting off, as they threaten to do, the communication between the plaintiffs' drain and the defendants' sewer—see, amongst other cases, *Attorney-General v. Clerkenwell Vestry*, 1891, 3 Ch., 527, and the cases there cited. Having regard to the provisions of Section 16 of the Rivers Pollution Prevention Act, 1876, I do not think that Section 7 of that Act gives power to the defendants to stop up the communication

* *Zeitschr. für Hygiene*, 1899, Band xxxii., p. 329.

in question, even if it had been proved beyond question (as it has not in fact been proved) that the liquid discharged from the drain into the sewer would prejudicially affect the disposal by application to land or otherwise of the sewage matter conveyed along the sewer. The defendants may or may not be entitled to some other remedy against the plaintiffs in respect of the effluent discharged into the sewer. I express no opinion upon the point, which does not arise in this action; but I am of opinion that the plaintiffs are entitled to an injunction to restrain interruption of the communication of the drain with the sewer.

BEFORE MR. JUSTICE GRANTHAM AND A SPECIAL JURY.

SMITH AND WIFE v. INNS OF COURT HOTEL (LIMITED).

THIS case arose out of the outbreak of food-poisoning which affected forty persons who dined at the hotel on July 17th, 1899. Two of the cases terminated fatally. It appeared from the evidence that the meat served on the 17th July (Monday) had been in the store since the previous Saturday, the weather at the time being particularly hot.

The jury found for the plaintiffs, damages £140, including £40 for expenses.

Judgment was given for that amount with costs, stay of execution being granted pending an appeal.

REVIEW.

THE PASTEURIZATION AND STERILIZATION OF MILK. By Albert E. Bell, F.I.C., F.C.S., District Analyst for Dorset. London: Rebman, Limited, 1899. Pp. 41. Price 1s. 6d.

THE object of this little work is to bring home to those interested in dairy work the necessity there is that the public should have a milk-supply free from injurious organisms. With this end in view, Mr. Bell describes in non-technical language what bacteriology is, and the important part it plays in connection with milk. Having pointed out the dangers likely to arise, the author proceeds to describe methods by which milk may be cheaply and effectively pasteurized and sterilized. Mr. Bell is careful to distinguish between these two processes, and his teaching appears to be in accord with the latest investigations (see *PUBLIC HEALTH*, xii., p. 555). While recommending the use of these processes, there is just the danger that farmers may think it unnecessary to take other precautions with regard to cleanliness; we are therefore pleased to note that Mr. Bell strongly urges the great importance of cleanliness and of care being exercised during the process of milking.

APPOINTMENTS.

Anderson, J., M.D. *Aberd.*, appointed M.O.H. of the Shire of Heytesbury, Victoria, Australia.
Beaman, E. H., L.R.C.P., L.R.C.S. *Irel.*, reappointed M.O.H. of the Master-ton Rural Sanitary District.
Bond, Francis Thomas, M.D. *Lond.*, M.R.C.S., F.R.S. *Edin.*, reappointed M.O.H. of the Cirencester Rural Sanitary District.
Bone, B. M., M.B., C.M. *Edin.*, reappointed M.O.H. of the Towyn Urban Sanitary District.
Drage, L., M.D. *Oxon.*, B.Ch., M.R.C.S., reappointed M.O.H. of Hatfield Rural Sanitary District.
Durrant, T. A., L.R.C.P. *Lond.*, M.R.C.S., reappointed M.O.H. of Market Harborough Urban Sanitary District.

- Flower, Frederick S.**, *M.R.C.S., L.S.A. Lond.*, reappointed M.O.H. of Warminster Urban Sanitary District.
- Gornall, J. H.**, *M.R.C.S.*, reappointed M.O.H. of Warrington Municipal Borough.
- Hands, A.**, *L.R.C.P. Lond., M.R.C.S.*, reappointed M.O.H. of Wednesfield Urban Sanitary District.
- Johnson, Henry Sandford**, *M.R.C.P. Irel., L.F.P.S. Glasg.*, reappointed M.O.H. of the Totnes Rural Sanitary District.
- Johnstone, James Pierce**, *L.R.C.P., L.R.C.S., L.M. Edin.*, appointed Deputy-M.O.H. of Langport (Somerset) Rural Sanitary District.
- Kilner, C. S.**, *M.B., C.M. Edin., D.P.H. Camb.*, reappointed M.O.H. of the Thingoe Rural Sanitary District.
- MacMillan, J. E.**, *M.B., Ch.M. Edin.*, appointed M.O.H. of the Shire of Wimmera, Victoria, Australia.
- Martin, John Middleton**, *B.A., M.B., B.C., D.P.H., Cantab., L.S.A.*, appointed M.O.H. of the Stroud (Gloucestershire) Rural Sanitary District.
- Mathews, J. S.**, *L.R.C.P., L.R.C.S. Edin.*, reappointed M.O.H. of the Machynlleth Rural Sanitary District.
- Ransome, A. S.**, *M.B., B.C., D.P.H. Cantab.*, reappointed M.O.H. of the Southgate Urban Sanitary District.
- Schlink, R. H.**, *M.D. Berl.*, appointed M.O.H. of the Shire of Wodonga, Victoria, Australia.
- Sharp, Hugh Culliford**, *B.A., M.B., B.C. Cantab.*, appointed M.O.H. of Truro Urban Sanitary District.
- Southey, A. J.**, *M.R.C.S.*, reappointed M.O.H. of the Eton Urban Sanitary District.
- Williams, Penrose Lanyon Watkin**, *L.R.C.P. Lond., M.R.C.S.*, appointed M.O.H. of the Cannington Rural Sanitary District.
- Wolfe, J. F.**, *M.B., C.M. Edin.*, appointed M.O.H. of the Heavitree Urban Sanitary District.
- Woodford, E. R.**, *M.D., Aberd., M.R.C.S.*, reappointed M.O.H. of the Ventnor Urban Sanitary District.
- Worger, Thomas Hewlett**, *M.R.C.S., L.S.A.*, reappointed M.O.H. of Radstock (Somerset) Urban Sanitary District.
- Young, M.**, *M.D. Edin., D.P.H. Viet.*, appointed M.O.H. of Stockport Municipal Borough.

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PUBLIC HEALTH

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EDITORIALS.

SECURITY OF TENURE.

THE Medical Officers of Health and Sanitary Inspectors Bill, drafted by the British Medical Association after consultation with the Incorporated Society, was introduced into Parliament on May 1st by Dr. Farquharson, the Bill being backed by Sir Walter Foster, Sir Francis Powell, Mr. Warner, and Sir George Pilkington. The Bill was set down for the second reading on May 16th, when Mr. John Burns objected, and prevented any discussion on the subject. Mr. Burns has, we are informed, announced his intention of making similar objection whenever the Bill is before the House. Unless the Government take up the Bill, there is practically no chance of its becoming law during this Session. We have on a former occasion* shown that there is need of intervention by the Government, and it now appears to us that the Government is really pledged to the main principle of the Bill.

The need of security of tenure is further shown by one of those periodically recurring supersessions of officers on standing for re-election. The history of the case, as it has been communicated to us, is as follows:

Dr. Wyndham Randall has been for fifteen years Medical Officer of Health of Penybont Rural (population 14,664) and of Bridgend Urban (population 6,000) Sanitary Districts, the salaries being respectively £75 and £40 per annum. In May, 1895, he was appointed Medical Officer of Health of Maesteg (Glamorganshire) Urban Sanitary District. His two immediate predecessors in office had resigned. In 1897 he was reappointed for three years, the Local Government Board offering at the time to sanction a permanent appointment. This May a new medical officer of health has been appointed. Dr. Randall writes: "I may add that I received no expression of disapproval

* See PUBLIC HEALTH, xii. 63 (November, 1899).

from the Council; nor was I made aware of their intention to fill my place until I saw their advertisement in the local papers, and up to now" (May 15th, 1900) "have received no formal intimation from the Council that my services have been dispensed with."

We are informed that the new medical officer of health is related to one of the councillors.

We think that the facts as set out above speak sufficiently for themselves, and that comment on the action of the Maesteg Council will be superfluous. We will only say here that such an occurrence would be impossible had medical officers of health that same security of tenure which is enjoyed—thanks to the action of the Local Government Board, not to special legislation—by medical officers of the Poor Law Service.

The discussion on the Bill now before the House for the amendment of the Housing of the Working Classes Act, 1890, has been mainly a severe criticism of the neglect on the part of local authorities to properly enforce the powers vested in them under existing legislation. Mr. Chaplin, in an unreported part of his speech on the Bill, alluded to the question of the existing tenure of office enjoyed by medical officers of health, and stated that the Local Government Board had in the great majority of cases power to intervene in regard to such tenure, and that the Board would do so if the officer were made to suffer for doing his duty. This, in our opinion, implies that the Board considers it right, not only for the protection of officers, but also of the community, that they should have security of tenure during good and efficient discharge of duty, and it seems to us that the Government cannot honestly refuse to give facilities for the passing of the Bill now before the House. We believe that Dr. Farquharson and Sir Walter Foster are in consultation with the officers of the British Medical Association on the question of approaching the Government with a view to securing such facilities. We think it right also to record the fact of a petition having been presented by the medical practitioners of Durham City in favour of the Bill, thus giving expression to that sympathy with the measure which we believe generally prevails among the profession.

The presentation of the petition has evoked an editorial in the *Lancet*, to which our attention has been specially drawn by a Fellow of the Incorporated Society, with strong expressions of dissent from the views enunciated by the *Lancet*. The editorial, after recording the introduction of the Bill and the presentation of the petition, proceeds as follows:

We appreciate the spirit which prompted this action on the part of the medical practitioners of Durham, led, we believe, by

Dr. E. Jepson of that city, and we trust that the petition may be favourably considered by Mr. Chaplin, with the limitation which we feel bound to indicate. It would perhaps, however, have been better had the petition referred only to such officers as devote their whole time to public health work of one or another kind. This question must eventually be decided by the elect of the people in the House of Commons, and this being the case, we have, in order to insure as great a measure of success as possible, to look at the matter not solely in its professional aspects, but also to ask how far such a general proposal as this is likely to prove beneficial to the public health and to the public health service. Moreover, we must have regard to what has a reasonable prospect of passing into law, and petitions in favour of legislation which no Government will ever give are to be deprecated. The ideal which has, to our thinking, to be aimed at is that of whole-time appointments—i.e., the creation of a public health service the members of which shall be specially qualified to practise that branch of their profession which they have elected. We question whether it is in the interests of this ideal that medical practitioners receiving perhaps the paltry salary of some £10 to £50 yearly shall have their offices converted into permanent appointments; indeed, we see in this proposal a serious obstacle to the development of whole-time appointments carrying salaries commensurate with the dignity of the office of a specially qualified medical officer of health. And, further, we have little hesitation in expressing the opinion that a measure such as this would have little chance of success in either Chamber of the Legislature. We speak plainly because we are anxious for reform in the present condition of affairs and are desirous that the prospect of reform shall not be obscured by proposals which we fear will carry with them no little condemnation in the eyes of the local sanitary authorities. To ask these authorities to pay for the services of an officer over whom they will have but limited control, and whom they will be unable to dismiss, however incompatible with his surroundings the officer may be, without the consent of the Local Government Board, is a somewhat far-reaching demand, and unless it is proceeded with cautiously defeat may be invited. The promoters of this measure would do well to introduce some differentiation into their scheme—to limit the fixity of tenure, if not to whole-time officers, at least to those who do not engage in private practice, and any further petitioners would be wise to take this line. It is, moreover, perhaps, desirable that before fixity of tenure is insured to any officer some period of probation, say one to three years, should be stipulated for, and that a diploma of public health shall be a *sine qua non* in all appointments of permanence. Some provisions such as these would, it seems to us, make the measure more acceptable to Parliament.

We believe that we are correctly stating the views of the Incorporated Society when we say that the Society is in favour of security of tenure being granted to all existing officers without reference to the terms of their appointments.* It does not seem fair, after securing

* This was agreed to at the Annual Meeting of October last.

the services of an officer, who may have experienced loss of practice by taking office, to leave him so situated that he dare not discharge his duty except at the price of loss of office at the next period of re-election, and the injustice is the greater because in most cases the terms of the appointment have been approved by the Local Government Board. As regards future appointments, we believe the Society would wish that the Local Government Board should have larger powers of control as to qualifications, conditions of office, salary, etc., and that the Board should be able to insist on the formation of combined districts, where necessary to furnish sufficient work and adequate salaries for whole-time service. With the granting of security of tenure to existing officers there is no necessity for allowing the perpetuation of conditions now prevailing, which do not conduce to good and efficient work. Any measure providing security of tenure which does not apply to existing officers who do not give their whole time to sanitary work will ultimately cause such officers to be dismissed from the service, and provision ought to be made in such a measure for the compensation of such officers on loss of office. We cannot deny that there is room for reform in the conditions now prevailing in the Public Health Medical Service, but we do not think that the requisite reformation should be secured at the expense of existing officers.

ENTERIC FEVER IN PARIS.

Visitors to Paris should be warned of the danger which exists in the water supplied to a considerable part of the City of Paris, and should be careful not to drink it alone or mixed with wine, syrups, etc., unless it has first been boiled or filtered through a Pasteur-Chamberland filter. Little notice has been taken in the press of this matter, but the danger is undoubtedly real, and is giving the Municipal Council of Paris very considerable anxiety at the present moment.

Not since 1892 had there been a mortality from enteric (typhoid) fever at all approaching that in the year 1899 (798 deaths in 1892, 802 in 1899), when 4,329 cases were notified, as compared with an average annual number during the four previous years of 1,315. A comparison of the first ten weeks of the years 1899 and 1900 leads to a conclusion which is not reassuring. During that period last year there were 398 cases notified, while in the corresponding period of this year no less than 891 cases have come under the notice of the authorities. There is little doubt that the

cause of this outbreak is to be traced to the water-supply, and chiefly to that portion of it derived from the river Vanne. The reports made by competent observers like Drs. Thoinot, A. J. Martin, and Miquel leave no other conclusion possible. Indeed, the specific bacillus is said to have been recognised and isolated from samples of the water taken from the river itself, from a reservoir at Montsouris, and from the supply of two army barracks, by several bacteriologists. Yet the Prefect of the Seine tried recently to persuade the Council that a mistake had been made by those who had examined the water, and that they had been misled by the resemblance which other organisms possessed to the Eberth bacillus into thinking they had really found the latter. It is reported that those who are attempting to keep the public in the dark about the matter have removed Dr. Thoinot from office for having ventured to make known his scientific opinion on this subject.

Other evidence, however, is too strong in incriminating the water of the Vanne, which seems liable to pollution near its source. Thus, in that part of the town of Sens which is supplied with water by a branch taken from the main aqueduct of the Vanne, enteric fever has appeared, while other parts of the town with a different supply have escaped. In Paris also the same selective action is seen. During February last, Ward 16, which derives its supply solely from the Avre, had not a case, while Wards 6, 7, and 11, supplied from the Vanne, had forty-eight, twenty-three, and fifty-nine cases respectively.

Parisians have been warned to boil all water which is to be used for drinking purposes, but visitors should also remember that vegetables which are eaten raw as salads may have been washed in unboiled water, and may thus be carriers of infection, as also may oysters which have been standing in such water.

FIBRINOUS RHINITIS.—Sila-Novitzky reports (*Société de Pédiatrie*, Moscow, April 19, 1899) four cases of this disease in which treatment by nasal douches, etc., produced no satisfactory results. Injections of diphtheria anti-toxin in three of the cases led to rapid recovery, although bacteriological examinations had proved the absence of the Klebs-Löffler bacillus in the exudation. M. N. Zak obtained similar results in respect of eleven cases under his care. In all fourteen cases had been examined bacteriologically, and in two only had the Klebs-Löffler bacillus been isolated.—*La Presse Médicale*.

SOME OF THE DIFFICULTIES INCIDENT TO THE ADMINISTRATION OF FEVER HOSPITALS.*

By E. W. GOODALL, M.D. LOND.,
Medical Superintendent of the Eastern (M.A.B.) Hospital, London.

WHEN your esteemed President did me the honour of asking me to read a paper before you this evening, he at the same time suggested, in case I had no suitable paper ready, two subjects, the discussion of which, in his opinion, would be acceptable to the members of your Society: the one was the subject I have chosen; the other, if I recollect rightly, was "The Influence of Isolation Hospitals on the Prevalence of Notifiable Diseases." The latter subject is a very fascinating one, and I should have liked to have dealt with it; but I felt that the time at my disposal was not sufficient to enable me to collect the necessary data from which conclusions of any value could be drawn. The subject I bring before you is one in which I have necessarily had experience, and I will merely preface my remarks by reminding those of you who have not held any post on the staff of a fever hospital that, though some of the questions may appear small, yet it is just in these small matters, which from their meanness get overlooked or are little attended to, that considerable trouble often arises with the various bodies with whom the authorities of the hospitals are brought in contact.

I have thought it convenient to treat the subject under four heads. Under the first I shall discuss the difficulties that arise in relation to the public; under the second those in relation to the general practitioner; under the third those which concern the sanitary authorities; and under the fourth those dependent upon the nature of the hospital itself.

1. DIFFICULTIES THAT ARISE IN RELATION TO THE PUBLIC.—The difficulties that are met with under this head are, I believe, becoming fewer every year, even though isolation hospitals are being multiplied and are being made use of by the public to a far greater extent than they previously were. I may remind you that eight years ago the Metropolitan Asylums Board had five fever hospitals in town, one small-pox hospital, and two convalescent hospitals. To-day the Board has ten town hospitals, one small-pox and two convalescent hospitals; a third convalescent hospital is to be erected shortly, and most of the old hospitals have been enlarged. The proportion of admissions to notifications has likewise increased in

* Read before the Incorporated Society of Medical Officers of Health, April, 1900.

a very notable degree from 42·8 per cent. in 1890 to 74·0 in 1898 for scarlet fever, from 17·8 to 62·4 for diphtheria, and from 22·4 to 36·9 for enteric fever. I have little doubt that the same changes have been brought about in the provinces. To put it briefly, of recent years fever hospitals have become more popular. Into the causes of this popularity it is not within my province to enter to-night; they are various. But I think I am entitled to assert that if the public did not place confidence in the administration of the hospitals it would not be so ready to make use of them. But with increased confidence on the part of the public comes heightened responsibility on the part of the administration, and we must remember that the augmented total of the admissions is largely made up of patients drawn from those classes of the community who are better able and more entitled to criticise administrative defects than is the pauper class to which the admissions were at one time entirely confined.

Now, when I speak of the difficulties attending the administration of fever hospitals, I can hardly avoid comparing them with other hospitals, and a comparison will show that there are some important points of difference. No patient enters a general hospital, as a rule, without the consent of himself or his friends; whereas a considerable amount of persuasion, to say the least of it, is at times necessary to compass the removal of a patient to a fever hospital. Occasionally children are removed during the parents' absence and without their consent, and I have not infrequently had occasion to soothe the anger of a father who has declared that, had he known that his child was to be removed to hospital, he would have stayed at home in order to prevent it. Consequently, in the minds of such persons, a prejudice is raised against the hospital from the very beginning, especially as they are almost invariably under the impression that it is the hospital authorities who have ordered the removal of the patient, probably because in London the Asylums Board supplies the ambulance. Thus prejudiced, these persons are ready to find fault with the slightest arrangement that appears to them to be wrong, and, if the patient is not restored after his recovery in as good a condition as, if not in a more perfect than, when he was admitted to the hospital, hasten to bring unfounded complaints of ill-treatment and neglect against the staff of the institution. But this frame of mind arises from ignorance, and ignorance is lessening, so that, happily, complaints of this nature are becoming more scarce.

Another grievance, also less often put forward nowadays, has reference to the length of time patients are detained in hospital.

In the case of a general hospital, should there be any dissatisfaction with respect to treatment or the conditions incidental to hospital life, the adult patient can leave, and the child be removed by his friends, at once. But there are obvious reasons against allowing such a step to be taken with respect to a fever hospital. It is not common for a parent to ask for his child's discharge before the end of five or six weeks from admission; but after that time he is apt to grow anxious, and I frequently am obliged to give either written or verbal explanations concerning this question. There really seems to be an idea in the minds of some persons that in some way or other the hospital staff derive advantage or gain from keeping a patient in hospital. But a judicious letter, or an interview with one of the medical staff, or permission to see the child through a door or window, usually has the effect of removing all anxieties and unpleasant feeling.

The necessity for forbidding of visiting is another point which is not understood by the more ignorant among the public until it is very clearly explained. Though, at the time the patient is removed, a printed notice is left at the house setting forth the regulations with regard to visiting, in many cases the notice is never read, or if so is not understood. Consequently I frequently receive appeals, especially from mothers, for leave to visit. The mother usually thinks it is very "hard on her" that she is refused. And so it is; and so I always allow it to be, when personal application is made to me for leave to visit. But I generally find that an appeal to her public spirit, together with an explanation of the risk of spreading infection, is enough to reconcile most mothers to a temporary separation from their children.

Lastly, there is one subject to which I will but briefly refer, even though it is of much importance. I understand, however, that it was very recently discussed by this Society. I mean the question of "return cases." One has the greatest difficulty in persuading the public, even the well-educated portion of it, that these are not, as a rule, due solely and entirely to gross neglect on the part of the hospital officials. So also with respect to relapses and second attacks of scarlet fever or diphtheria, or the onset of some unusually deferred complication, or, though rarely, of some other disease occurring soon after the return home of a patient. Only a few days ago I received a bitter, sarcastic, and finally threatening letter from a parent whose child, discharged on a Wednesday, had by Sunday developed symptoms of diphtheria, a disease for which he had been in the hospital upwards of six weeks, and from which he had completely recovered when he was sent out. Fortunately, these cases

are rare; but it is necessary that every patient should be examined by a medical officer immediately before discharge, and a record of the patient's condition be made at the time. If a patient is sent out still having an aural or nasal discharge, or some other ailment, the friends should be interviewed by a medical officer, and advice should be given them both as to treatment and as to the advisability of keeping the child away from other children for a time. The Asylums Board has ordered the issue to the friends of every patient discharged after recovering from diphtheria of a printed notice which informs them of the early symptoms of diphtheritic paralysis, and advises that, should these symptoms arise, medical aid should be immediately obtained. I believe this notice has been of considerable use.

2. DIFFICULTIES THAT ARISE WITH THE GENERAL PRACTITIONER.—These are very few, and such as are met with arise almost entirely over errors in diagnosis. Considerable harm may be inflicted on the reputation and practice of a medical man if it becomes known among his patients that a case which he has pronounced to be of an infectious nature, and which has in consequence been removed to a fever hospital, has turned out to be one of some non-infectious disease. The medical officer of the hospital is not infrequently placed in a dilemma over such cases. On the one hand, if he sends the patient home immediately, or very soon after arrival at hospital, the medical practitioner may suffer; on the other hand, it is certainly not right to detain the patient (save in certain cases) for more than a short time, at any rate. For not only may the patient contract some infectious disease, but the question of the ratepayers' money has to be considered. There can be no question that the interests of the patient and the ratepayers have to be put in the front, and endeavour should be made to avoid unpleasantness by explaining, if necessary, to the friends, that while a case of infectious disease should be removed as soon as possible, yet in its early stage there are many difficulties and pitfalls to lead astray and harass the medical attendant. Of course, if the latter is so lost to all sense of honour as to notify cases on very flimsy evidence merely for the sake of fees accruing to him (and, unfortunately, there is no doubt that there are such disgraces to the profession), then if, in consequence of his errors, he falls into discredit with his patients, he has only himself to blame, and is deserving of no sympathy. But with the practitioner who, through no fault of his own, commits a mistake, I have every sympathy, and I think as much as possible should be done to put matters right between him and his patients. I believe that the public is getting to realize the difficulties that

beset the question of diagnosis, and is in consequence more ready to be lenient than it used to be.

Many of these wrongly-diagnosed cases cannot be sent home speedily, on account of their being seriously ill. Others, by being admitted into the receiving-room of the hospital, are thereby exposed to infection, and must on that account be detained in hospital. Hence it is necessary to have isolation-rooms for the reception of these cases. Those cases run most risk which are erroneously diagnosed as scarlet fever or measles in hospitals which admit the latter disease. The cases wrongly diagnosed as enteric fever or diphtheria practically run no risk at all.

The diagnosis difficulty is almost the only one met with in regard to the general practitioner in London. I suppose, however, that in those fever hospitals in the country in which the patient can be attended by his own medical man differences may arise between this practitioner and the medical officer of the fever hospital, who is usually, I believe, the medical officer of health. I should think it would be a more politic practice to put the hospital patients under the care of one man (with assistants if necessary), who should, if possible, not be in practice in the neighbourhood. But if this arrangement cannot be carried out, it is clear that the medical officer of the fever hospital should be a man gifted with tact. A system of consultation over doubtful cases might prove helpful.

I think it is a great pity that some general practitioners give much too decided opinions as to the subsequent course of cases they are sending to the hospital. It would be preferable if they referred the friends for further information as to prognosis to the medical officer of the hospital; it certainly would be more judicious on the part of the practitioner. There is a tendency rather to underrate than overrate the gravity of the case, and I have frequently had to explain that Dr. So-and-so was mistaken when he said that the patient would soon get all right. As the patient is being transferred to other hands, it is quite unnecessary for the practitioner to commit himself concerning his future.

3. DIFFICULTIES THAT ARISE WITH REGARD TO THE SANITARY AUTHORITIES.—I suppose that difficulties under this head can exist only in places where the fever hospital is controlled by an authority other than the sanitary authority, as in London. Even then they are few in number, and, as far as my experience goes, are concerned almost entirely with the question of "return cases."

I have, however, on more than one occasion had some correspondence, usually of a friendly nature, with sanitary authorities about the diagnosis of cases of diphtheria. A case is sent in as one of

diphtheria which is not clinically an example of that disease. A bacteriological examination is made in the hospital, with negative results, the patient is discharged, and the medical officer of health is informed, in accordance with a resolution passed by the Metropolitan Asylums Board. Then comes a letter from the medical officer of health stating that some eminent authority has made a bacteriological examination previously to the patient's removal to hospital, and has found the bacillus; and the medical officer of health expresses surprise at the early discharge of the patient. In such instances I have replied that, if a case is of so doubtful a nature as to need a bacteriological examination to arrive at a diagnosis, it would save time, trouble, and inconvenience if the fact were stated on the certificate of disease or the admission order.

There is one other point, though it is not of much importance, to which I will refer. Some sanitary authorities, on the removal of a patient to an infectious hospital, cause a printed notice to be left at the house, stating that the patient will be detained for a certain specified number of weeks. If for any reason, such as the occurrence of complications, the patient remains in hospital for longer than the stated period, the friends are disappointed and inclined to grumble, especially as in the minds of many of them the sanitary and hospital authorities are one and the same, as I have pointed out before. Considering, however, the number of sanitary authorities and fever hospitals in London, I think that it is a cause for congratulation that the complaints made by the one set of authorities against the other are so few in number.

4. DIFFICULTIES DEPENDENT UPON THE NATURE OF THE HOSPITAL ITSELF.—These are the difficulties which I find to be the source of most of my troubles and anxieties. They may be divided into two groups: (1) those connected with the patients, and (2) those with the staff.

(1) *Difficulties connected with the Patients.*—One of the most troublesome questions the administrator of a fever hospital has to deal with is that relating to the occurrence of infectious diseases amongst the patients other than those for which the patients have been admitted to hospital. I am not now referring to those cases of mistaken diagnosis to which I alluded when I was discussing the difficulties with the general practitioner. The proper method to prevent such cases from becoming infected with another disease is either to send them home at once, or, if that be not possible, to put them into an observation or isolation ward. But I have now in my mind cases where a patient, having been in hospital for a period more or less lengthy, and being perhaps almost ready for discharge,

develops some other infection, on account of which he has to be detained for several weeks longer, and from which he may die. It has always been my practice to inform the friends of the patient of the occurrence of the second disease; and if the affection be notifiable, notice is also sent to the medical officer of health; and of all the duties I have to perform this is the one that causes me the most keen annoyance, which is in no way mitigated by the receipt of a letter from the vexed parent, who wants to know how it is that his child, who is being *isolated* (this word being underlined), has caught some other disease, and either says, or pretty plainly hints, that in his opinion the administration of the hospital is grievously defective.

From the published reports of the Statistical Committee of the Asylums Board, it appears that these cases of second infection occur in every one of their hospitals; and from similar and other evidence it is also certain that they occur in other fever hospitals both in this country and abroad. On the occurrence of such a case, one asks one's self the question, Is this due to any administrative defect? The hospital of which I have the care admits practically only three infectious diseases—scarlet fever, diphtheria, and enteric fever—and this question is naturally raised when an instance of one of these diseases shows itself among the convalescents from either of the other two. A very eminent and highly respected authority on sanitary questions on one occasion, indeed, suggested that the post-scarlatinal diphtheria in the Asylums Board hospitals did result from administrative errors. But if we turn to the reports to which I have above referred, it will be found that outbreaks of diseases not professedly admitted to the hospitals arise among (especially) the patients suffering or recovering from scarlet fever and diphtheria—such disorders, I mean, as measles, chicken-pox, whooping-cough, and the like.

It is easy to understand how the outbreaks of these latter affections occur. They all have, compared with scarlet fever and diphtheria, long incubation periods. A child exposed to the infection of one of them has time, before the characteristic symptoms set in, to catch and show signs of scarlet fever or diphtheria, and to be removed to hospital. After he has been in hospital for a few days out come the symptoms of the first infection, with the result that an outbreak occurs in the ward.

These infectious diseases may also be introduced through erroneous diagnosis. The prodromal rash of measles or chicken-pox may be mistaken for scarlet fever, or the early laryngitis of measles for diphtheria, and so on.

These mishaps might be avoided in many instances if information of the presence of other infectious diseases in the house from which the patient has been removed to hospital was given to the hospital authorities. But this is not always the case, so that, as far as the administration of the hospital is concerned, these accidental infections are unavoidable. The co-existence of infectious diseases depends chiefly upon the prevalence and age-incidence of the diseases concerned. If one of the infectious diseases that commonly attack childhood be at all widely prevalent, it will sooner or later gain an entrance into a hospital for children, and more especially into a hospital for infectious diseases, not only because the latter is to all intents and purposes a hospital for children, but also because infectious diseases lend themselves very readily to errors of diagnosis of the kind likely to bring about the result we are discussing. Every infectious hospital, therefore, must be provided with an ample number of isolation wards, for it is, of course, out of the question to discharge the patients before they have recovered from both the original disease for which they were admitted and the secondary disease they have acquired in the hospital.

There is one class of these mixed infections upon which I will dwell in some detail. I refer to those cases of diphtheria in which symptoms of scarlet fever show themselves within a few days from the onset of the diphtheria. The usual history of such a case is as follows: The patient, who has been ill for two or three days, is admitted with well-marked symptoms of diphtheria; often the larynx is affected, and subsequently there is typical paralysis. After he has been in hospital for a few hours to a few days, and in some instances has been improving as regards the diphtheria, undoubted signs of scarlet fever appear—pyrexia, vomiting, rash, and a fresh faucial inflammation. In severe cases of diphtheria the rash may be the sole sign of the coexistence or addition of scarlet fever. Since the incubation period of the latter disease may be from twelve to seventy-two hours, and perhaps longer, the question arises, Were these patients infected with it before admission, or have they been infected in the ambulance, the receiving-room, or the ward?

At one time I used to think that these cases were infected in the ambulance. We were not then so careful over the disinfection of the ambulance blankets, nurses' clothes, etc., as we are now. But as there does not appear to have been any appreciable falling off in the number of these cases since the introduction of a more stringently regulated practice with regard to the ambulance arrange-

ments, I have come to the conclusion that infection in an ambulance is of very rare occurrence, if, indeed, it ever takes place. In support of this view, I may say, further, that it is very rare for cases erroneously diagnosed as scarlet fever or diphtheria to show signs of either of these diseases within such a period as would lead to the supposition of infection in the ambulance. I have, however, known a patient in a few instances to be infected in the receiving-room. This result has come about through the simultaneous arrival and reception of two or more patients certified to have diphtheria, one of whom has been found to have scarlet fever; and the same accident may happen with other infectious disorders. I have also known a patient to be infected almost immediately after being placed in a ward from a case previously admitted, but undiscovered as to its dual nature. Lastly, the infection may have been conveyed by one of the staff; and I have known instances where, through a breach of the regulations, there was reason to believe that this had occurred. But if the precautions enjoined upon the staff are duly observed, the spread of infection in this way is very exceptional. In fact, in most of these cases of scarlet fever following immediately upon diphtheria there is no evidence of the scarlatinal infection being given in the ambulance, in the receiving-room, or by the staff. One is therefore driven to conclude that in these cases the infection of scarlet fever has been caught before the patient's admission, and that in some instances, at any rate, the appearance of the rash is delayed. Occasionally there is evidence of this previous infection, as in the following cases: A man, aged thirty, was admitted to the Eastern Hospital with an undoubted and severe attack of diphtheria; he subsequently had paralysis, so that there was no question of the diagnosis. He was stated to have had vomiting and a sore throat on February 19th, and he was admitted on February 21st. Two of his children had been removed some days before to another fever hospital with scarlet fever. The day after his admission, February 22nd, he vomited several times, and on the morning of the 23rd it was discovered that a bright scarlet rash had come out during the night. Again, a girl, Louisa W., aged six years, was admitted to the Eastern Hospital in the afternoon of March 20th. She had been taken ill on March 18th, and was clinically a well-marked case of diphtheria. Her sister was already a patient in the hospital with scarlet fever, having been admitted on February 22nd. Louisa W. developed a scarlet rash on March 22nd. In both these instances a patient living in a house already infected with scarlet fever was attacked with diphtheria, and did not show any definite sign of scarlet fever (the rash) until

two days after admission to hospital, and the fifth day from the onset of diphtheria. I believe, further, that in certain severe cases of scarlet fever, or of mixed diphtheria and scarlet fever, the appearance of the rash is delayed.

The difficulties attending these cases can readily be understood. I consider it to be a very fortunate circumstance indeed if no case of scarlet fever occurs in the ward to which one such has been admitted. They are sufficiently numerous at the Eastern Hospital, together with the post-scarlatinal diphtheria and post-diphtherial scarlet fever cases, to keep a ward of twenty beds, and often several small two-bedded wards in addition, filled during the busy season.

Connected with these cases of diphtheria in which definite symptoms of scarlet fever show themselves soon after admission are two other classes of cases: (a) Those in which the patients are attacked with both diphtheria and scarlet fever before admission to hospital, but in which the symptoms of the latter disease are masked by those of the former; and (b) those in which the patients have scarlet fever with little or no rash, but in which the condition of the fauces in the early stages closely resembles diphtheria. These cases are more common than is usually supposed. That the rash might be wanting in scarlet fever, even of a severe form, has long been known. Graves, in his "Clinical Lectures," drew special attention to this point. It is usually one of these severe cases of scarlatina anginosa without a rash that is mistaken for diphtheria, and admitted to the diphtheria wards; and perhaps it is not till two or three of the other patients have been attacked with the disease that its nature is recognised. The diagnosis of these cases in their early stages is very difficult. I may, perhaps, be allowed to quote a few remarks I have made elsewhere on this point:

"The onset of scarlet fever is usually accompanied by vomiting, which is not the rule in diphtheria. A high temperature, delirium, and marked swelling, with vivid redness of the fauces generally, are in favour of scarlet fever. But it is often impossible to distinguish a mild case of scarlet fever, before the appearance of the rash, from one of diphtheria. The rash may be absent or insignificant and transient, not only in very slight cases of scarlet fever, but in a few severe cases with serious angina. These cases are a source of much trouble in diagnosis, for not infrequently there is thick, pultaceous, or even membranous, exudation upon the fauces. In such cases the diagnosis cannot be made with certainty till a late period, when the exudation has cleared off, leaving behind deep or extensive ulceration, or until the characteristic desquamation has com-

menced. Anything beyond superficial ulceration is uncommon in diphtheria. In the cases of scarlet fever to which we are referring, suspicion is often roused before ulceration or gangrene has occurred by the irregular but continuous pyrexia (often with delirium), the persistence of the exudation (the more remarkable if antitoxin has been administered under the supposition of diphtheria), and the rapid emaciation of the patient. The larynx is rarely affected in scarlet fever; when this event does happen, it is either secondary to intense cervical cellulitis, or it occurs later in cases where there is extensive and spreading faucial ulceration."*

The amount of trouble to which one may be put by these different kinds of cases may be gathered from the following figures: During the two years 1898 and 1899 there were 82 cases of scarlet fever which were sent to the Eastern Hospital with the diagnosis of diphtheria; the error was discovered either on or very soon after admission, and in few, if any, of the cases was there any definite clinical evidence of diphtheria. On the other hand, in only 8 instances was diphtheria sent to the hospital as scarlet fever. During the same two years there were 92 cases of diphtheria, in the majority of which, either on or within three days of admission, symptoms of scarlet fever were detected.

Of the other infectious diseases, there were 13 cases in which scarlet fever patients were infected with measles before admission, 13 with chicken-pox, and 7 with whooping-cough; there were 43 cases in which diphtheria patients were similarly infected with measles, 24 with chicken-pox, and 11 with whooping-cough. Thirty-four scarlet fever patients caught measles, 39 chicken-pox, 7 whooping-cough, and 32 diphtheria; while 40 diphtheria patients caught measles, 48 chicken-pox, 8 whooping-cough, and 102 scarlet fever. The number of completed cases among which these secondary infections occurred were, of scarlet fever 1,630, and of diphtheria 2,650.

The practical administrative points to be emphasized as a consequence of a consideration of the above cases are: (1) That every infectious hospital must be well supplied with small isolation rooms or wards; (2) that the ordinary wards for scarlet fever, diphtheria, and measles should, if possible, be small rather than large, so as to lessen the risk of the spread of other infectious diseases accidentally introduced; and (3) that it is inadvisable to set aside wards for infants, but that patients of different ages should be equally dis-

* "Encyclopædia Medica," vol. iii., p. 12, article "Diphtheria."

tributed, as far as possible, through the wards. This measure will also tend to limit the spread of other infectious disorders.

It has been suggested that separate infectious diseases should be treated in separate hospitals, with the object of excluding the risk, however small, of conveying different infections from one side of the hospital to the other in hospitals where more than one disease is treated. But the facts I have brought forward above indicate that, even were that suggestion to be carried out, you could not expect to keep out the other infectious diseases. Both the North-Eastern and the Fountain Hospitals of the Metropolitan Asylums Board were utilized when first opened for scarlet fever cases only, and the former hospital has never been employed for any other disease. Yet post-scarlatinal diphtheria has occurred in these hospitals equally as frequently as in the other hospitals of the Board where diphtheria wards have existed for some years past, and other infectious disorders break out in the wards from time to time.

When a case of the more severe infectious diseases (*e.g.*, scarlet fever, measles) occurs in a ward, I put the ward into quarantine; that is to say, I do not admit any fresh cases to the ward from outside, nor discharge any of those already in who may be fit to go home, nor send any of them to the convalescent hospital, and the ward is left in quarantine as long as may be needful. Sometimes a ward has to be quarantined for several weeks in consequence of successive crops of cases. If many cases occur, the ward must be emptied at the end of its quarantine period, and thoroughly disinfected. Quarantining a ward means diminishing the number of beds available for new admissions, and therefore may be a serious matter in exceptionally busy times. I usually, however, except adults from this measure, so that if there are any empty beds in a ward when it is put into quarantine, they can be filled by transferring adults from other wards. Quarantine also has the effect of unduly prolonging the stay in hospital of some of the patients; but I think that this is preferable to starting a small epidemic, say of measles, outside, an event which would almost certainly occur if I discharged a susceptible patient who had been exposed to the infection. In the cases of the less severe maladies (*e.g.*, varicella and rubella) I do not quarantine the ward. When a patient is discharged from a ward in which such a case has occurred, I interview the friends and inform them of the patient's exposure to infection.

The matter which I shall now briefly touch upon may perhaps be deemed trivial, but it has at different times been a source of much annoyance both to the friends of patients and the hospital

authorities, and special regulations have been framed in consequence. I refer to the condition of patients as regards cleanliness at the time when they are admitted to hospital. If a person sends to a fever hospital a child concerning whom every care has been taken at home to keep it clean, he rightly expects to have the child returned to him in the same state in that respect, and has very strong grounds of complaint if the child's hair is found, on reaching home, to contain nits or pediculi. But in consequence of the large number of patients (about 60 per cent. of the scarlet fever and diphtheria admissions of all ages) whose heads are found on admission to contain the insects or the nits or both, it is a task requiring extreme diligence and care to prevent the clean children from getting into the same state. On the admission of every patient the head should be examined, and a note made of its condition. If it be deemed necessary to cut the hair short, let it be so treated at once, as there will then be time for it to grow again to a respectable length before the day arrives for the discharge of the patient. Parents, as a rule, do not object to having their children's hair cut short if it is done on admission; but they do object if this measure is carried out only just before the child leaves the hospital. If a child has a beautiful head of hair, orders are given to preserve it if possible. But I think we are justified in insisting on the shearing of the most luxuriant tresses if they serve to harbour filth, for the sake of the other patients, let alone of the nurses. Ringworm, also, is another source of annoyance.

(2) *Difficulties connected with the Staff.*—The administration of a fever hospital is not simplified by the fact that it is necessary to keep a proportionately much larger resident staff than in a general hospital or workhouse infirmary. The proportion is increased chiefly by the inclusion of the ward-maids, laundry-maids, and porters, who need not be resident in the latter institutions. The prevention of the spread of infection both in the hospital itself, and from the hospital to outside, can only be insured by stringent regulations stringently enforced.

But the chief difficulty with respect to the staff has been, and still is, the question of obtaining and keeping a complete and suitable staff of nurses. Formerly it was difficult to get good nurses at all. Now, however, as far as the Asylums Board hospitals are concerned, this difficulty is confined almost entirely to one particular class of nurses (the first-class assistant nurses); at any rate, this is so at the Eastern Hospital. At one time, directly the number of patients under treatment began sensibly to diminish a corresponding reduction was made in the staff. This

occurred usually during the spring and summer. Consequently, when the inevitable rise in the admissions took place in the autumn, nurses had to be hurriedly engaged; and those really competent and suitable would not enter the service because of the uncertainty of tenure of office. Now, however, a staff of nurses sufficient for the hospital when full of patients is constantly kept, and opportunity is taken of the slack season to let the nurses take their holidays. The salary of the nurses has been raised, and their conditions of living much improved. But though so much has been done, we have not yet arrived at perfection. Many of the charge nurses, I find, have a good deal to learn after entering upon their duties. I may explain that it is a *sine qua non* for a charge nurse that she shall produce before being engaged a certificate of having undergone three years' training in a recognised training-school for nurses. And many nurses go through their whole period of training without ever having nursed a tracheotomy case, syringed out a throat, or passed a nasal tube. On matters relating to infection, too, they are often much below the standard of knowledge required of a charge nurse in a fever hospital. Often when they have received instruction on these points, have gained sufficient experience to enable them to undertake the nursing of fever cases in private, and have served long enough to be entitled to a testimonial, off they go. Consequently the nursing staff is constantly changing. This same difficulty is met with in regard to the assistant nurses; and there are others into which I will not enter, as they are concerned with a particular grade of nurse peculiar, I believe, to the Asylums Board (the first-class assistant nurses), and it would not be fit for me to discuss them in this place.

A fever hospital cannot expect to attract to its service in any large number women of the stamp nowadays to be found in the best general hospitals. The latter offer a training in most, if not all, branches of nursing, which the fever hospital can never do. Life, too, in a fever hospital often means a certain amount of social ostracism; and the fear of contracting one of the infectious diseases is another factor acting against such a hospital. Though the nursing arrangements have been much improved of recent years in the Asylums Board's hospitals, yet there is still room for further improvement; and I do not doubt that in course of time this will be accomplished.

I have alluded above to the fear of contracting one of the infectious diseases as one of the causes preventing women from becoming nurses in fever hospitals. This is no idle fear. During

1898, of 4,192 persons employed in the fever hospitals of the Metropolitan Asylums Board, 1,449 were warded on account of illness, and 8 died. It is true that but 212 of these persons suffered from scarlet fever, diphtheria, enteric fever, or typhus—the chief diseases, that is, that are admitted to the hospitals. But tonsillitis and other throat affections, measles, influenza, and gastro-enteritis, figure largely amongst the returns of staff illness; and these affections are contracted in the course of duty in the wards. Unfortunately, the members of the staff are much more likely to fall ill at times of greatest pressure, partly on account of the nature of the cases admitted, partly on account of their work being more trying at that time; and as at the same time the ambulance work (for which certain of the hospitals supply the nurses) is also at its heaviest, one often has considerable difficulty in insuring the proper nursing of the wards on the one hand, and the requisite amount of recreation for the nursing staff on the other; and occasionally it is absolutely necessary to temporarily engage extra nurses.

I have thus briefly put before you most of the difficulties that I have myself encountered during the eight years that I have occupied the post I still hold. I have no doubt that I have omitted to deal with some matters that have proved a source of trouble to other administrators of fever hospitals, and that, on the other hand, I have fallen over stumbling-blocks in a path which has been quite clear and unobstructed to others. I have always endeavoured to make allowances when troubles have arisen through the action of other people. But even then I fear I may have considered the question too much from my own point of view. To-night, however, I am prepared and desire to hear these same questions discussed from other sides; and in such a society as yours, meeting in such a city as London, where we have the combined wisdom of the many sanitary authorities, the County Council, and the Asylums Board to deal with matters relating to infectious diseases, I hope to derive from representatives of these various bodies, as well as from those who come from those happy regions where there is a less divided responsibility but a more despotic power, and where the superintendent of the fever hospital is his own medical officer of health—I hope to derive from these, I say, many valuable suggestions on questions concerning the proposed treatment, of which I am still in the dark.

DISCUSSION.

Dr. H. BEALE COLLINS said he had listened with very great interest to Dr. Goodall's remarks. They were somewhat alarming to one who, like himself, was trying to induce his authority to build a hospital. The remarks made about small wards were interesting, but the proposals were difficult to carry out

on account of the expense. He would like to ask Dr. Goodall whether, in his opinion, the large size of the Metropolitan Asylums Board's hospitals exerted any influence on the contracting of diseases by the patients in the hospitals and on the frequency of "return" cases. The only cases of the latter class among over 100 cases notified last year in his district had occurred amongst those who happened by accident to be admitted into one of the Board's hospitals. One of the "return" cases was that of a patient who had been in the Fountain Hospital, where she contracted diphtheria. When discharged as cured, she went to stay with some friends, one of whom developed the disease. She then went into the country, and on her return another person with whom she was associated also contracted the disease. She subsequently came into his (Dr. Collins's) district to stay with relatives, one of whom was attacked with diphtheria. He then communicated with the Medical Officer of Health of Fulham, from whose district the patient originally came; a swab was taken from her throat, and the diphtheria bacillus was isolated, four or five months after she was discharged from the Fountain Hospital.

Dr. WILLOUGHBY (Eastbourne) said he had had the management of a small hospital for some time, and was much interested in the difficulties which had been brought before them. There were one or two difficulties he experienced which had not been dealt with in the paper. One was the length of time a scarlet fever patient should be detained when there was a little desquamation on the heel; another was the discharge of diphtheria patients. In connection with the latter he would ask Dr. Goodall what faith he put in bacteriological examination as a guide to the discharge of patients. On the question of visiting, he said that at Eastbourne they allowed parents to visit the hospital grounds once a week, to look in through the windows and see their children. In addition to this there was a telephone from the porter's lodge to each ward, through which parents could converse with the children.

Dr. H. M. RICHARDS said, with regard to cases which were doubtful on admission, he found the greatest difficulty in dealing with those sent in as scarlet fever which by the time they arrived at the hospital had no symptom of any disease. When the hospital was being worked to its fullest extent it was almost impossible to find isolation wards for all such cases, and in that event he made it a habit to send them all to the scarlet fever ward. As to the secondary diseases contracted by patients in hospital, in his opinion the reduction of the size of the ward was the best and most effective means of prevention. One way out of the difficulty of expense which had been referred to was to have the ward divided into two parts, treating at one end the patients who were in bed, and at the other those who were up and about. With regard to post-scarlatinal diphtheria, there could be no doubt that such cases were quite unconnected with administrative methods. They occurred outside the hospital at about the same time and approximately as frequently as in hospital.

Dr. GWYNN said there was no subject more interesting to medical officers of health than that which Dr. Goodall had brought before them. They had discussed the question of "return" cases some time ago, and came to the conclusion that they did and would occur. He, however, would be glad to know from Dr. Goodall whether there had been any diminution in such cases, and whether Dr. Simpson had made any report on the subject. He (Dr. Gwynn) would like to ask who should be responsible for giving the certificate required by the nurse charged with the removal of a patient. Most practitioners maintained that the medical officer of health should give it. In his district a copy of the

notification certificate was supplied, because that was the quickest method of securing removal; but sometimes removal was required on a Sunday, and the medical officer of health was then expected to give the necessary certificate about a case of which he knew nothing at all. With regard to Dr. Goodall's statement that some 25 per cent. of the nurses were laid up in the course of a year, he pointed out that this threw a very heavy burden on the parish in which the hospital happened to be situated. All these cases were credited to such parish, which was a reasonable ground of complaint.

Dr. MILLSON said that Metropolitan medical officers were very much indebted to Dr. Goodall and his colleagues for their courtesy. They fully appreciated what a great blessing the Asylums Board's hospitals were to the community. With regard to "return" cases, he was convinced that some patients were sent home in a highly infectious state. Sometimes there was a rhinitis which had not been observed at the time of discharge from the hospital, or was perhaps developed by the bath to which the patient was subjected prior to discharge. It did not appear that any lengthened stay in hospital would prevent such occurrences, as "return" cases had been observed after detentions of eight, ten, or even fourteen weeks, and he doubted if the hospital staff could do anything to prevent them. He was disposed to think they were in some way associated with the aggregation of a large number of patients. He thought the only remedy would be to divide the patients into smaller groups. Dr. Goodall had suggested that the medical officers of health should look after these cases; but how could this be done in the absence of all knowledge of the dates of discharge of the patients? If the Metropolitan Asylums Board would adopt a sensible system, and send intimations to medical officers of health when patients were discharged, it would greatly facilitate matters.

Dr. BOND, adverting to the question raised by Dr. Gwynn, said he always found a copy of the notification certificate was accepted by the nurse for removal purposes, and a copy was always sent with the inspector when he visited to make his inquiries. On Sundays the medical practitioners were urged to secure the removal of patients, and a special fee was paid to them for doing so.

Dr. KENWOOD referred to the question asked by Dr. Collins as to whether "return" cases were confined to patients nursed at the Asylums Board's hospitals. He was in charge of a very small hospital, where a good many cases had been treated, and during six or seven years he had not had a single "return" case. He was beginning to congratulate himself when, some four months ago, two patients discharged after scarlet fever gave rise to "return" cases. One of these cases, seen by himself before discharge, appeared to be absolutely free from all symptoms of the fever. Fourteen days after the patient was discharged he had a note from the medical practitioner to say the patient was desquamating freely. That was a case of recurrent desquamation. The Metropolitan Asylums Board ought to have printed instructions to give to the parents when a child was sent home, stating that the patient cannot be guaranteed absolutely free from infection, and that it was desirable that such child should be kept apart from other children for at least a week. Dr. Goodall seemed to raise a doubt as to the medical officer of health of a district being the right person to be in charge of the infectious hospital. There were some very material advantages in such an arrangement, but there were also some serious disadvantages. In Stoke Newington, for instance, he received a number of notifications of diphtheria, but, on visiting the cases, he found they were not true diphtheria. Had he been the medical superintendent of the hospital, he would have had the onus of telling

the practitioner he had made a wrong diagnosis; but, Stoke Newington being in the Metropolitan area, the children were sent to the Metropolitan Asylums Board's hospital, from whence they were returned as "not diphtheria." That was an instance where it was of benefit to the medical officer of health not to be in charge of the hospital. As to the visiting of patients by relatives, he fully sympathized with Dr. Willoughby's remarks in favour of parents being allowed to do so. The regulations of the Metropolitan Asylums Board on this point were very severe, the risks, in his opinion, being greatly exaggerated. In the small hospital he had referred to they allowed the parents to come and look through the windows, and converse with their children through open windows, and he never knew of any spread of the disease as a consequence.

Dr. O. FIELD said the point he was interested in was the relationship between the medical superintendent and the practitioner. He recently saw a case of clinically well-marked diphtheria: it was admitted to the Asylums Board's hospital, but on a bacteriological examination a negative result was obtained. The patient was kept in hospital for three weeks, and then sent home. In reply to inquiries made the medical superintendent said the patient had not had diphtheria. This statement was made on the bacteriological examination only, and not on clinical grounds at all. Similar statements had been made by other practitioners at the same hospital. In his opinion this was not sufficient ground to affirm that a patient was not suffering from the disease in question. Another point was as to the certificate authorizing removal. He thought that medical officers of health were not acting wisely in encouraging the use of certified copies of the notification certificate, because the person who gave the removal certificate certified as to the fitness of the patient for removal. If the practice was encouraged of getting the practitioners to fill up these certificates it would be a great advantage, and he generally succeeded in getting this course adopted in his district.

Dr. ALLAN said he dealt with the difficulty of the fitness of a patient for removal by having the words "This patient is.....in a fit state to be removed to the hospital" printed at the foot of the notification certificate. If the patient was unfit for removal the practitioner inserted the word "not" in the blank space.

Dr. J. HOWARD JONES, speaking on the subject of enteric fever, said he understood this disease in London was treated in general hospitals, but in provincial towns it was only taken into the isolation hospitals. He, however, had at the present time two cases of enteric fever in the ward of a general hospital. He did not consider such a ward fit for the treatment of such cases, because the cubic space was only half that allowed in the isolation hospital, and the general hospital was not built or intended for infectious cases. He would like to have an expression of opinion on the point. He allowed visiting once a week, on Sunday afternoons, and had never experienced any bad results from the practice.

The PRESIDENT said the question had been raised as to the relative advantage of a medical officer of health being also the medical superintendent. He happened to hold the combined offices at present, whilst previously he had been medical officer of health and not medical superintendent. From his experience in both categories he had no hesitation in saying that the combination of the two offices was greatly to the advantage of the community. The medical officer of health should be able to follow the cases right through, so as to be able to pursue his investigations by personal communication with the patient, and with the parents of

the patients. Some time of every week-day of his life was spent in interviewing parents. That was extremely valuable, because it enabled him to find out the complete history of the various cases. In London the communication with the patient was, of course, impossible, and to that extent London suffered. Some of his greatest difficulties arose from wrong diagnosis. There were black sheep in every fold, and there were practitioners who would notify every case of sore throat as diphtheria. Then he wished he was not the medical superintendent. In such cases he thought there was no harm in detaining the patients for a short time. The wrong diagnosis of scarlet fever was a very difficult question. Cases sent in after four or five days did not look at all like the disease. There was no sudden vomiting, and the rash had disappeared. His practice was to wait for three weeks for desquamation. Unless there were strong grounds for doubting the certificate it was better to accept the diagnosis and treat the patient in the ward. He agreed with Dr. Meredith Richards that it was impracticable to keep all such patients in an isolation ward. He was interested in Dr. Goodall's remarks as to cases of sore throat which were not diphtheria, and were followed after a few days by the rash of scarlet fever. He thought many of such cases were really cases of scarlatina anginosa, in which the rash was delayed, and not cases of superadded infection. They caused great confusion, and gave a lot of trouble. Dr. Goodall gave the weight of his authority to the term "infectious" hospital. He (Dr. Newsholme) particularly objected to that term. It was not the hospital which was infectious, but the patients in it. He would suggest the use of the word "isolation," as one more in keeping with the facts. He was interested in Dr. Goodall's statement about dirty heads, which were a source of very great difficulty, only to be met by most drastic treatment. With regard to post-scarlatinal diphtheria, it was going too far to say the frequency of such cases was proportional to the amount of diphtheria outside the hospital. Occasionally an undetected case of diphtheria plus scarlet fever was admitted to hospital. At Brighton every case of scarlet fever was examined bacteriologically on admission, and they thus detected cases of diphtheria which might otherwise have given rise to secondary infection in the scarlet fever ward. On the other hand, he did not regard negative results as being absolutely reliable.

Dr. GOODALL, in reply, said he had not said much about "return" cases, because that subject had been thoroughly discussed quite recently. There was no doubt such cases occurred in hospitals outside London. The Metropolitan Asylums Board had made an exhaustive inquiry into the subject, and a long report had been printed, which had been sent round to the members of the Board and the medical superintendents for consideration, and the question of what action was to be taken thereon was now before the Board. The question of small wards was, he knew, one of expense. It was a choice of two evils. If it was considered that isolation hospitals tended to prevent the spread of infectious diseases, it was better to have the hospitals even with large wards than none at all. He agreed that possibly too much stress had been laid on the risks of infection consequent on visiting; but it was not only the risk of infection which had to be considered. The size of the hospital created a difficulty, and had to be considered; and the question of cleanliness was also intimately connected with that of visiting. It was astonishing what a filthy state some of the people came in. They had a considerable amount of discretion allowed them in the matter of visiting, and, on the whole, people were fairly satisfied if they were seen and the necessity for their not visiting explained to them. The question raised by

Dr. Richards about doubtful cases was one that troubled every medical superintendent. Patients were admitted after the rash had disappeared, and he endeavoured as far as possible not to send such cases into the general ward. The possibility of so doing depended on the amount of isolation-wards available at the time. If such cases did not peel or show other signs of scarlet fever in three weeks they were sent home. It was quite certain that they could not be sent away when admitted. He was not prepared to say that a patient who had diphtheria bacilli in his throat was necessarily infectious. He had a case in hospital once for months, and once a week had a culture made, but could not get rid of the bacilli. Ultimately he sent the child home. Two or three weeks after he was brought back, and another culture taken. The bacilli was still found, but he had heard nothing more about the case, and was not aware that it had given rise to any other cases. A child was generally found to be free from infection in from four to six weeks. The question of the certificate for the nurse on removal he had not considered, as it was not part of his business. They had to have some sort of certificate or they would get applications for the removal of all sorts of cases. The illness amongst the staff to which he had referred amounted to not quite a quarter, but of these only 212 were cases of scarlet fever, diphtheria, or enteric fever. The cases were spread over the whole of the hospitals and convalescent homes of the Metropolitan Asylums Board. He did not think he suggested that the medical officer of health should look after "return" cases. Personally he had no objection to notices of discharge being sent to the medical officers of health, and had recommended that being done. No printed instructions were issued when scarlet fever patients were discharged. That, again, was a suggestion he favoured.

ROYAL MASONIC INSTITUTION FOR BOYS.—We desire to commend the candidature of William Peehey Smart, who will be up for election in October next. He is the eldest of a family of five children, and the son of the late Medical Officer of Health of Hoxne Union, who has been obliged to give up his practice on account of failure in his health, and is now without means of providing for the education of his children. Proxies may be sent to the Editor.

WATER FILTRATION.—The *Scientific American*, in commenting upon the results of the recent instalment of the filtration beds in connection with the water-supply of Albany, says: "The disease directly traceable to the sewer-polluted water of the Hudson was typhoid fever, the death-rate from which in the city of Albany for nine years ending 1898 had averaged 85 per annum. During the first four months in which the filters have been in operation, 7 deaths from this cause have been reported. During the corresponding interval of nine years ending 1898, the average number of deaths was 24; so that the filtration of the water has reduced the deaths from this cause in the ratio of 24 to 7. The filtration plant at Lawrence has reduced the typhoid fever death-rate in that city from 11.31 to 2.54. The filtration plant in the city of Hamburg, Germany, was put in operation in 1895; during the five years previous to that date the average typhoid death-rate was 4.72; since that date it has fallen to .72. Since the opening of the filtration plant at Mount Vernon, N.Y., in 1894, the number of deaths from typhoid has decreased over 76 per cent. The average cost of operating the filters at Mount Vernon, including the laboratory work, is \$1.67 per 1,000,000 gallons."—*Albany Medical Annals*.

MUNICIPAL DISPENSARIES.*

By CHARLES SANDERS, M.B.,
Medical Officer of Health of West Ham.

WHEN first invited to read a paper to the Branch, I was given absolute freedom of choice as to my subject, being informed that I need only promise to open a discussion. This opportunity of laying before you any topic which my official duties have called to the front, and in connection with which difficulties have presented themselves, and of gaining your sympathy and support in arriving at a practical solution of those difficulties by free discussion, offered such an alluring bait that I make no apology for occupying your time or seeking your aid in the consideration of a subject which has recently forced itself upon my attention.

The area of the borough which I serve may be roughly described as an oblong, four miles from north to south, and two miles from east to west. It is situate immediately upon the eastern boundary of the Metropolitan area, is devoted to factories, docks, and railway works, employing many thousands of hands, and is covered by miles of two-storied dwellings mainly occupied by two or more families, the breadwinners of which are either employed in the local industries or earn their livelihood in London, merely using West Ham as a dormitory.

The natural growth of the borough has developed from three centres of colonization, somewhat resembling the ossification of a long bone in which the epiphyseal development proved much more exuberant than that of the diaphysis, thereby inducing an artificial division of the district into two halves—north and south, a division which, though fast disappearing, is yet frequently an important factor in local politics and municipal organization. As illustrative of this, it may be mentioned that we have two public halls, the Town Hall proper being in the northern division, and an equally large hall in the southern, each hall being furnished with a municipal organ in requisition for alternate municipal recitals and for other public purposes. We have also two public libraries, two public baths, and it is proposed to augment our present stabling department by a second yard in the southern division.

At the end of last year I was instructed by my council to report on "the probable cost of providing and maintaining two free municipal dispensaries." As the first step in obeying this order,

* Read before the Home Counties Branch of the Incorporated Society of Medical Officers of Health, February, 1900.

I obtained particulars of management from most of the provident dispensaries in London and the provinces, there being, so far as I am aware, no entirely rate-supported dispensary in this country.

The circumstances of provident dispensaries varied in so many particulars that the information obtained offered very little assistance in framing a scheme for West Ham, a result which might have been judged *a priori* from the essential differences in the inception and development of provident and rate-supported institutions.

It became evident that the conditions of West Ham had to be considered on their merits, and that definite instructions were absolutely essential on many points pertinent to the inquiry before any estimate of cost could be attempted. For example, were the institutions to be wholly free or were they to partake in any way of a provident character? Were the necessary buildings to be specially constructed, or might existing premises, if found suitable, be adapted for the purpose? Were the dispensaries to be merely for the attendance of out-patients, or were the sick to be visited at their own homes? If solely for out-patients, what estimate could be made of the numbers likely to attend for treatment? and if visitation also were to be included, to what distance from the dispensary should such visitation extend? Out of the foregoing, subsidiary questions arose, such as the number of medical men required to undertake the work, whether they should be resident or non-resident, the approximate sites of the dispensaries, etc.

Thus far only have we gone in West Ham. Those essential questions have not been answered; the matter is still considered *sub judice*, although the exigencies of municipal works of a more pressing nature have for a time shelved the original motion.

But what is to be said of the idea of free municipal dispensaries, which, being interpreted, means free medical attendance for all and singular the inhabitants of a district at the expense of the rates? Are there not hospitals enough? May we not send our sick to them to be cured? Impulsively one might be disposed to answer yes; but there must be many medical officers of health of rapidly growing districts who would pause before adopting such an uncompromising affirmative, even if they were not disposed to deny the present sufficiency of hospital accommodation, while it is very clear, from the fact of the resolution instructing me to investigate the matter having been passed by an urban sanitary authority, that there is, at least in one district, a considerable feeling of unrest in connection with the subject.

Before further considering the question, one may properly discuss

its legal aspects. Sections 131, 132, and 133 of the Public Health Act, 1875, provide as follows:

Section 131.—Any local authority may provide for the use of the inhabitants of their district hospitals or temporary places for the reception of the sick, and for that purpose may themselves build such hospitals or places of reception, or contract for the use of any such hospital or part of a hospital or place of reception, or enter into any agreement with any person having the management of any hospital, for the reception of the sick inhabitants of their districts on payment of such annual or other sum as may be agreed. Two or more local authorities may combine in providing a common hospital.

Section 132.—Any expenses incurred by a local authority in maintaining in a hospital, or in a temporary place for the reception of the sick (whether or not belonging to such authority), a patient who is not a pauper, shall be deemed to be a debt due from such patient to the local authority, and may be recovered from him at any time within six months of his discharge from such hospital or place of reception, or from his estate in the event of his dying in such hospital or place.

Section 133.—Any local authority may, with the consent of the Local Government Board, themselves provide or contract with any person to provide a temporary supply of medicine and medical assistance for the poorer inhabitants of their district.

It is clear from these sections, first, that the local authority may provide hospitals; and, secondly, that they may charge the patients (other than paupers) with their cost of maintenance. Hitherto the sections have only been used for the purpose of erecting hospitals for the reception of persons suffering from "dangerous infectious diseases" within the meaning of the Act. This may to some extent be owing to the fact that Sections 120 to 133 are headed "Infectious Diseases and Hospitals"; but I believe lawyers hold that the headings so interpolated have no statutory value, being merely inserted for convenience, in which case the action of the local authority would be free and unfettered to provide hospital accommodation for their sick inhabitants, whether they be suffering from infectious diseases or not. How far this freedom of action would apply to municipal dispensaries depends entirely upon the extension of the terms "hospitals or temporary places for the reception of the sick." I can see no difficulty in including such an institution as a dispensary within the meaning of the expression "temporary places for the reception of the sick." Indeed, common-sense suggests that the essential points in connection with institutions provided under Section 131 are: (1) that they are for the reception of inhabitants of the district, and (2) that the persons received into them must be sick, the mere length of time during which the sick person remains in the institution not entering into the question at all.

If this view be correct, it follows that a local authority may build and maintain a general hospital for the treatment of all diseases, together with associated departments for out-patients, and also may charge all the patients treated in such hospital, provided they be not paupers. It does not follow, however, that the provision of medical visitation at the sufferer's own home, such as is usually associated with the dispensary system, would fall within the scope of Sections 131 and 132. Home attendance is provided for by Section 133, but is there hampered by the necessary consent of the Local Government Board and by being limited to the poorer inhabitants of the district, while no definite permission is given to charge the poorer inhabitants with the cost of the temporary assistance provided. This section (133) has always been looked on as applicable only to some special emergency outside the ordinary duties performed by a local authority in maintaining the public health. It cannot, however, be applicable to formidable epidemic, endemic, or infectious diseases, as the very next section (134) specifically provides for these; and if not so applicable, one can scarcely imagine under what circumstances the provision could be called into operation, nor am I aware that it ever has been used since it was first drafted in the Sanitary Act of 1868. Should a local authority desire to put in force Section 133 for the purpose of providing a municipal dispensary, I feel that it would be no easy task to estimate the character of the evidence likely to be required in order to obtain the consent of the Local Government Board. This interesting legal question we may safely leave in the hands of the lawyers, and pass to the utilitarian side of the subject.

Among other communications, I received the following letter from the chairman, treasurer, and secretary of the Metropolitan Provident Medical Association:

J. Lamb's Conduit Street, W.C.,
November 7th, 1899.

Communications referring to the proposed establishment of two free municipal dispensaries in West Ham have been received by us from the Blackfriars, Bloomsbury, and Hackney Provident Dispensaries, which are branches of this association, and have been carefully considered. It does not appear to us that the statistics of our work—which is exclusively provident—would be of service to your committee as a basis for the establishment of free institutions carried on on totally different lines. At the same time we shall be glad to render every assistance in our power if it is found possible to give the proposed dispensaries a provident character. A large experience among the working classes of London has convinced us of the harm likely to arise from the provision of free, indiscriminate medical relief for helping poorer persons able to do something towards helping themselves in this

matter. The granting of free medical attendance of an ordinary kind—as distinct from special or consultative treatment—to persons not coming under the provisions of the Poor Law is a direct incentive to improvidence, and we believe that your committee will agree that the expenses incurred for such treatment should be defrayed when possible out of the family earnings. The aim of this association is to establish provident dispensaries throughout London and its suburbs, and so enable the working classes to meet the ordinary expenses of illness by means of small payments on insurance principles, made periodically during sickness and health alike, which secure good medical attendance and medicine when required. While we admit that there may be cases suitable for free treatment, we find that the great ease by which gratuitous medical relief can be obtained often prevents persons from joining a provident institution who would otherwise do so, and who are well able to pay the subscription to it.

The establishment of free dispensaries is to be deprecated also in the interests of local medical practitioners, who may by the competition of these institutions be deprived of a legitimate source of income.

We earnestly trust that your committee will see its way to establish the proposed dispensaries on some such lines as we have indicated, for we are convinced that they will thus inculcate habits of thrift and independence, and a much greater benefit will be conferred on the community than will be the case if persons are encouraged to obtain medical relief without any exertion on their own part.

Everyone, I imagine—at least, in this room—will agree with the terms of that letter so far as it goes. Unfortunately, it does not go far enough. There is in every industrial centre an enormous class of persons who are neither paupers nor in receipt of good average wages, and are at present out of the reach of the various agencies for medical relief. They do not belong to any provident institution, either from the want of thrift mentioned above, or more often because no such institution is within a reasonable distance. If a hospital out-patient room be available, they are hindered by the necessity of obtaining a hospital letter, and consequently are compelled to engage medical services for which they are quite unable to pay (a fraud on the doctor), or else to indulge in that very cheap medicine which is too often a fraud on the patient. It is this class that swells the sickness and mortality lists of the medical officer of health from bronchitis in winter, diarrhoea in the summer, and epidemics of measles and whooping-cough whenever they occur, and any measure calculated to check such waste of life and health must force itself on our careful attention.

Some municipalities have endeavoured to meet the case by the appointment of health visitors, who leave memoranda of directions to be observed in cases of illness, and attempt by example and

precept to instil habits of cleanliness and a knowledge of elementary hygiene into the more degraded households. While recognising the value of such work, it must be evident to all who are conversant with the homes of the poor that the measurable benefit likely to be derived must be small unless a huge staff be employed. Nor does the appointment of health visitors meet the yearning for what I may call “institutional treatment,” of which the resolution we are now discussing is the outcome—a yearning very real, growing ever daily, and, by a singular irony of fate, the direct product of the hospitals founded for its relief, which result must be borne in mind in considering the establishment of free institutions.

At first sight there is something peculiarly attractive in the suggestion of hospitals and dispensaries free to all comers, and certain analogies might be drawn between free medical treatment and free education. Both are the offspring of Christianity, both tend to improve, directly and indirectly, the individual and the community, and consequently both are subjects in which every member of the community is equally interested. But if this be so, the matter becomes one of national rather than local importance, and should be dealt with on national lines. It appears to me to be somewhat significant that the proposal for the establishment of free medical institutions supported by local rates should have emanated from a district which has been most heavily handicapped by the local rating for purposes of free education.

Bearing in mind the practical nature of the English race and their habit of moulding their institutions without violent revolutions, it would appear that the establishment of free medical treatment for the community, even if ethically sound, is rather a remote contingency for the end of the nineteenth century. Yet having regard to the acknowledged failures of our present system, the growth of a desire for institutional treatment, the absence or insufficiency, especially in the suburbs, of a supply adequate to meet the demand, the recognition not only by the medical profession but also by the public that the existing hospitals and other charitable institutions are grossly abused, and, indeed, to the very existence of such a body as the Charity Organization Society, I do think the time is fast approaching when a reorganization of medical relief agencies would be advantageous, and that such reorganization might conveniently be municipal.

At the present time the council of a county or county borough through its committee of visitors is the body charged with the care and treatment of the insane; the board of guardians is charged with the treatment of all pauper sick, and the urban sanitary

authority with the treatment of the infectious sick. In many places the municipalities are taking upon themselves the special treatment of consumption. For general purposes a body of gentlemen form themselves into a committee, and by the aid of the charitable public found and maintain a hospital which caters for a favoured class, namely, those who are fortunate in living near the institution and can obtain hospital letters. Lastly (I speak of my own district, but my statements are applicable to all the suburbs), owing to the depopulation of Central London, the poor are spreading farther and farther away into districts scantily provided with public institutions, carrying with them the recollection of past facilities for hospital treatment, and in vast numbers of cases expending time and money in journeying to and fro in order to satisfy their craving for such treatment—time and money which might well be spent in obtaining equally efficient attention nearer home. This multiplication of authorities for the treatment of disease not only involves wasteful expenditure on administration, but gives rise to many anomalies in actual practice. For instance, the board of guardians in the union infirmary deal with a special class, paupers, but not with the whole of them; for many paupers are received into the general hospitals supported by voluntary contributions, while other paupers rightly pass to the care of another authority in the lunatic asylum. Others, again, are treated by the local sanitary authority in their infectious disease hospitals. In my own district we receive all notified cases, paupers or non-paupers, without question, and are thereby doing some of the work of the poor law authority. Surely there is no inherent reason why the care of disease in all its forms should not be the special work and obligation of the local sanitary authorities, either singly or in combination, nor, looking to the fact that the sanitary authorities already have a large part of such obligation imposed on them, which in the larger districts at least they have not been incapable of satisfactorily discharging, should the practical difficulties of handing over to them the other links in the chain of medical relief be insuperable. The chief difficulty, of course, would arise in severing pauper medical relief from the jurisdiction of the poor law guardians, but assuming that an arrangement could be made by which the sanitary authorities could take over the maintenance of the union infirmary as their base hospital, so to speak, or even a local hospital for general purposes already supported by voluntary contributions, there would then be but one step necessary for concentrating the local control of medical relief, namely, the establishment of a sufficient number of municipal dispensaries in situations

which could best be decided on by the sanitary authorities. Such a series of dispensaries could well be worked on lines somewhat similar to the existing institutions, but all local medical men should, after a few years' residence, have the right of being attached thereto, and be paid in accordance with the services rendered, while each dispensary should include within its functions a home for nurses, who should assist in visiting the outside cases in conjunction with, and under the direction of, the medical officers.

In passing, one may add that some such reorganization as is here foreshadowed is rendered more desirable by the growth of district nursing establishments, which, at present unattached, are gradually giving rise to sister charitable institutions, which would be much more potent for good were they associated with recognised hospitals and dispensaries. It will, I think, be admitted that one of the prime causes of the acknowledged hospital abuse proceeds from the increased orderliness and comfort which has sprung from the modern nursing system, an orderliness and comfort which has overflowed from the wards into the out-patient room, and might with organization reach the overcrowded sick-room of the tenement-dweller.

Such a municipal system of hospitals and dispensaries spells in very large letters "money"—money which could not be expected from voluntary contributions, as is evident from the pecuniary condition of the large London hospitals, in spite of the unusual recent efforts for their relief; money, too, that should not be extracted wholly from the rates, but money which might be forthcoming from a combination of the charitable donor, the ratepayer, and the person most interested—that is, the recipient of the medical treatment. The wealthy are constantly assisting the municipal authorities in the provision of public libraries, etc., and some surely might be willing to aid in founding medical as well as literary institutions. On the other hand, the power now possessed by the sanitary authorities of recovering the cost of maintenance of patients in hospitals should be extended to include the cost of out-patients, and this power should be used unhesitatingly against all comers other than paupers, according to their means. I believe this to be the only way to check the growing abuse of the out-patient room, and to be ethically sound with respect to municipal medicine as it is to municipal gas, water, or tramway undertakings.

In conclusion, it may be asked, *Cui bono?* The large hospitals with medical schools do not fall within the scope of this paper, being founded for all time, although even in them, if my contention be right and an equitable charge be duly enforced, I feel convinced

that not only would the existing abuse be largely mitigated, but also that the out-patient departments would be more profitably employed with cases sent up for consultation from the municipal dispensaries or by private practitioners from among their poorer patients.

In the extra-Metropolitan and suburban districts the advantages are obvious:

To the municipality, a complete control of all the agencies for the abatement of sickness within their district, a ready means of dealing with disease, and an undoubted improvement in the public health.

To the pauper, a removal of class distinction, always felt, but doubly keen when due to unforeseen or unavoidable illness.

To the general public, a direct interest in their own medical institutions, and a knowledge that adequate medical and nursing skill are at all times within easy reach and available in their own homes when required, with the certainty of obtaining, if need be, the most eminent ability.

To the medical profession, direct remuneration for work done and indirect remuneration by the cessation of very much eleemosynary work which they now, *volentes volentes*, undertake; an increased interest in much of the medical work among the poor owing to its being carried out in connection with public institutions and in conjunction with trained assistants; and as corollaries to this institutional work more frequent opportunities of fraternal consultation, a greater incentive to legitimate professional rivalry, with, as its natural result, a constant levelling up of local medical attainments; and, lastly, a welding of the profession into a Public Medical Service, with common interests, aims, and duties.

To the medical officer of health, who should be the pivot of such a municipal system, it would bring, through the books of the various institutions, more immediate and exact information of the sickness in his district and other circumstances tending to affect the public health, a more direct association with his medical colleagues in his daily duties, and a means of rapidly dealing with cases which are now constantly brought to his notice, but in which he is powerless to act.

I have, I fear, all too feebly expressed my meaning, merely touching upon several debatable points which might be more fully elaborated; but with the sense of the ever-spreading tendency to obtain gratuitous medical relief at charitable institutions, of the feeling of unrest, not only in the profession, but also in the public mind, that something must be done, and with the certain conviction

that the existing hospitals by their position and character do not reach the needs of the most deserving, I offer the foregoing suggestions as a crude attempt at a solution of the problem, and invite your comments and advice. In conclusion, I submit the questions—

1. Is a system of municipal hospitals and dispensaries, somewhat on the lines indicated, desirable?
2. Is it possible?
3. If so, is it presently practicable?

BACTERIA IN MILK AND OTHER FOODS.—It has long been known that nearly all foods, even when prepared with the greatest cleanliness, usually contain a large number of bacteria; and it is equally well known that these bacteria are usually perfectly harmless, and some scientists have gone so far as to assume that these micro-organisms are essential to digestion; however, the experiments of Thierfelder in the physiologic laboratory at Berlin showed very conclusively that this is not the case. The question of the number of germs contained in milk-products is, nevertheless, a matter of some interest, and Bloch (*Berl. Klin. Woch.*, January 22nd, 1900) has recently carried out a series of experiments along this line. One gramme of the preparation to be tested was weighed in a sterile dish and mixed with 100 c.c. of sterile water, and 1 drop of such preparation was added to 10 c.c. of bouillon, or was diluted three times and spread over a gelatin plate or over agar. After twenty-four hours Bloch found that over 100,000 colonies of bacteria had developed on the sterile agar, while after forty hours the growth on the gelatin was so great that it was impossible to count the colonies. In order to determine whether other food preparations contained as many germs, Bloch carried out a similar series of investigations with flour and oatmeal, and he was unable to find that there was any considerable difference in the number of germs contained in these food-products. Prausnitz (*Grundzüge der Hygiene*) estimates that butter contains from 10,000,000 to 20,000,000 of germs per gram. Bloch emphasizes the fact that the harmfulness of foods does not depend upon the number of germs contained, but upon their kind, as only the pathogenic germs are capable of working harm to our bodies, and he suggests that the greatest care should be taken to make certain that milk-products are obtained from healthy cows.

There is still another lesson to be gained from these experiments: The fact that the harmless germs grow so freely on nearly all food-materials proves that they are excellent culture media, hence the greatest care should be taken to prevent the contamination of all foods, and particularly such foods as milk, which is eaten without being sterilized by cooking. A great deal has been done in this direction through the efforts of Munn of Denver, Wende of Buffalo, and other sanitarians, and this work should be continued until a careful supervision of the milk-supplies of all the cities of our country is an assured fact.—*Phil. Med. Jour.*

DIARRHOEA IN CHILDREN.*

By FRANCIS HAWKINS, M.D.,

Physician to the Royal Berkshire Hospital, formerly Clinical Assistant to the Hospital for Sick Children, Great Ormonde Street, etc.

Dr. FRANCIS HAWKINS commenced by discussing diarrhoea as met with in pneumonia, scarlet fever, measles, and nephritis; then diarrhoea due to local irritation and acute and chronic dyspepsia, reflex diarrhoea and diarrhoea in rickety and tuberculous children. He then proceeded: I now ask you to discuss with me that very fatal form of so-called diarrhoea. So many names have been given to this form that the whole subject seems to me to be in complete chaos. Let me mention a few names: Infantile Diarrhoea, Choleraic Diarrhoea, Infantile Cholera, Dysenteric Diarrhoea, Gastro-enteritis, and Gastro-intestinal Catarrh, Infective Diarrhoea, Epidemic Diarrhoea, and perhaps more commonly Summer Diarrhoea, and still more recently, by Professor Vaughan, Acute and Subacute Milk Infection. On turning over the reports of the causation of death, especially those of Ballard, we find yet another list of names: Atrophy, Marasmus, Convulsions, Hydrocephalus, Vomiting, etc.

I now venture to submit to you that the disease called or designated by all these various names is a specific disease, as much so as pneumonia, enteric fever, tuberculosis, rheumatism, or cholera. And in so doing I am not claiming any new idea; for Ballard in 1887 strongly indicated "that autumnal diarrhoea was an infectious disease impending on soil in the first and season in the second instance." He also adduced facts showing that the disease was not solely a chemical intoxication, but due to some microbe derived from a particular soil and capable of multiplying within the animal body. Hænoch writes: "I still think that an abnormal chemical action in the contents of the stomach and intestine set up by unknown influences is to be regarded as the primary process."

Later on I shall revert to the morbid anatomy of this condition, but will merely mention here that although some of the gravest symptoms in most speedily fatal cases are accompanied by the most superficial lesions, yet it would appear that the intestines in all cases exhibit more or less pathological change. I therefore propose to call this disease *Infantile Enteritis*, and define it as an acute specific disease occurring during all seasons of the year, but

* Abstract of a Paper opening a discussion at a meeting of the Reading Pathological Society, February, 1900.

most frequently during the summer months, affecting not only children but adults and those advanced in years. You may say, If this disease occurs in the adult, why speak of it as "infantile"? I would, however, remind you that while we speak of Infantile Paralysis, yet this same paralysis is met with in adults, and this, therefore, is my excuse, if such be needed. The ætiology of this *Infantile Enteritis* is somewhat obscure; but recent experiments made by Klein and Andrewes would tend to show that it may be due to the *Bacillus Enteritidis sporogenes*. In observations made by Klein on bowel discharges and bowel contents of eleven infants, he found that in four fatal cases the spores of *Bacillus Enteritidis* were detected by culture, and that in six fatal cases and in one non-fatal case bacilli, as chains and as cylindrical rods, could be demonstrated in microscopic specimens of the bowel contents. These bacilli he thought were *Bacillus Enteritidis* in a non-sporing state. "In this disease the bacteria which normally inhabit the child's alimentary canal, and are under normal conditions beneficial, multiply enormously, and their products act as severe general poisons and as a local irritant to the mucous membrane of the digestive tract" (Thompson). The poisons produced differ apparently in the degree of irritation to which they give rise; some cause choleraic symptoms. Chemical changes are by Baginsky thought to be important. He thinks that, while the lesions of the mucous membrane and general intoxications are certainly produced by the products of bacteria, it seems exceedingly probable that the abnormal multiplication of these is often secondary to a functional chemical change in the contents of the stomach and bowel.

Of the predisposing causes, that which affects us most as practitioners of medicine is food; for while the surroundings are of importance, yet the disease does affect children having the best of surroundings.

Food as a Cause.—Feeding is a very important factor. Children fed from the breast are remarkably exempt. Of 1,000 fatal cases recorded by Hope 30, of 602 cases recorded by Meinert 24, and of 341 by Ballard 7, had the breast exclusively; therefore if we take the total—viz., 1,943 fatal cases—only 3 per cent. had the breast exclusively. Hope found

I. "That infants fed in whatever way with artificial food to the exclusion of breast milk are those which suffer the most heavily."

II. "That children fed partially at the breast and partially with other kinds of food suffer to a considerable extent, but very much less than those brought up by hand."

III. Respecting the use of the bottle, Hope found that it is

decidedly more dangerous than artificial feeding without the use of the bottle.

Maternal neglect and carelessness in infant management is also an important factor in the causation of this disease. I now come to consider

Age.—As I am only considering this disease in relation to children, it may be said that the disease is one of early infancy, occurring mostly during the first two years of life. Henoeh found its frequency mostly during the first and second years of life. Holt and Crondal found that

14	per cent.	of their cases	occurred under six months.
29	"	"	between six and eighteen months.
17	"	"	" eighteen and twenty months.
16	"	"	over two years.

We must now discuss the symptomatology.

This disease may be met with in a very acute or in a less severe form, and may resemble very closely an unusually severe form of acute indigestion. A study of the symptoms of this disease will itself suggest its specific infectious nature; for there may be no prodromata—nothing whatever to indicate its onset, no local, no constitutional disturbance. The child may appear in good health and be suddenly attacked. In other cases the child may be out of sorts—fretful, restless, and distressed. The temperature may rise to 102°, 103°, or even 104°. The child may be dull and sleepy, the bowels slightly loose, and in most cases there is more or less general disturbance of the nervous and vascular systems.

As to symptoms proper, *vomiting* is constant; it at first consists of undigested food and later of watery mucus, and it may be tinged with bile. Ballard found that in only 43 out of 326 fatal cases was vomiting absent during some period of the illness. Vomiting usually occurs at the commencement of the illness, in some cases not till the end of the first or at the commencement of the second, and in some instances not till the third or fourth day, and in other instances it does not occur until the end of the illness. On the other hand, vomiting may be the one prominent symptom from first to last, or it may cease after the first day and not recur.

Vomiting may occur concurrently with *Diarrhoea*.

Diarrhoea.—The disease may run its course without this symptom being present in any marked degree, and thus it may not be noted as a symptom. In most cases, however, diarrhoea is sufficiently marked for anyone to note that the frequency and quantity of the stools are abnormal, and Ballard observes that "in most cases diarrhoea is a prominent symptom, lasting throughout the illness, or only disappearing shortly before death." The diarrhoea may be

trifling in quantity at first, and then as the disease advances become profuse. I saw in consultation not long since a case where the diarrhoea was so slight at first that no notice was taken of the child's illness until vomiting and slight twitchings attracted attention. On the other hand, the diarrhoea may be from the first extremely profuse. There is, I believe, nothing particular to note as to the colour of the stools. They may, however, resemble in character those of cholera, or of dysentery, and may be associated with tenesmus, or even prolapsus ani. While the stools are usually offensive, they are not so in every instance.

Nervous Phenomena.—A knowledge of these is of some importance, for in not a few instances has the cause of death been certified as "convulsions," when the real disease causing death has been "infantile enteritis," and thus a symptom has been assigned as the cause of death instead of the disease. What would be thought of a man, I wonder, certifying œdema of the legs as a cause of death in a case of heart disease?

But few cases run their course, especially the fatal, without exhibiting some nervous phenomena. These in some instances are slight, such as working of the hands, rolling of the head or eyes, or a slight twitching of the limbs. On the other hand, marked convulsions may be present, which may be unilateral, but are usually general. One case which I saw in consultation at first had regular convulsive movements on one side only; after the convulsions there was marked twitching of the face. Later the convulsive movements became general. The relations of diarrhoea and vomiting to these nervous or convulsive phenomena have been well worked out by Ballard. He found that in some cases when diarrhoea or vomiting increased suddenly in severity, the convulsive phenomena first appeared; in other instances when the diarrhoea or vomiting, from being severe, lessened, or ceased, these convulsive phenomena set in, the eclampsia replacing the vomiting and diarrhoea.

I may here refer to the condition known as *hydrocephaloid*, which frequently occurs in this disease, described by Marshall Hall; the characteristic symptoms being "advancing apathy and drowsiness, half-closed eyes, flattening or depressing of the great fontanelle, opacity of the cornea from fragments of mucus, great weakness of the pulse, and fall of temperature."

The temperature may be high at first, and fall later below normal; this is especially so in fatal cases.

The urine is usually reduced in quantity.

Emaciation.—This again is a symptom of some importance, for deaths are not unfrequently certified as "marasmus," "atrophy," etc. Emaciation is a part of the disease, and may proceed with consider-

able rapidity. A fairly well-nourished child may become emaciated or atrophied in the course of a very few days. Especially is this noticeable in the adductor muscles of the thighs. Subsequently the extremities become cold and clammy, the abdomen soft and retracted.

Such are, in brief, the symptoms of a disease I venture to call "Infantile enteritis"; and most of you will, I think, agree with me in thinking that such symptoms suggest that the disease is an infective one. Compare the symptoms with those of other acute infective diseases and I ask, is there not a marked resemblance?

One word as to the *pathology*, and here I must quote Henoch, who writes: "We find nothing at all that is characteristic. We generally observe nothing but an abnormal pallor of the digestive mucous membrane, or perhaps only a slight enlargement of the solitary glands and Peyer's patches; in others, streaks of redness and swelling of the mucous membrane of the intestine and stomach." He also alludes to changes in other organs. Ballard found marked changes in the intestines, even in those of infants, the total duration of whose illness did not exceed twelve or fourteen hours. For the most part the intestines were empty, or only contained a little yellow faecal matter or mucoid fluid, or the surface was coated with some thick creamy catarrhal exudation. The amount of hyperæmia of the mucous membrane of the stomach and intestines varied sometimes. There was observed some follicular ulceration both in the small and large intestine. Generally there was more or less inflammatory thickening of the mucosa, and even in the cases of only a few hours' duration, denudation of the epithelium both of the stomach and intestine. Now and then ecchymoses were seen, or even a little blood effused into the alimentary canal. The solitary and agminated glands of the small intestine were mostly prominent; the mesenteric glands were enlarged.

Besides the changes in the intestine, Ballard also found changes in other organs. The *liver*, exhibited in nearly all cases fatty degeneration of its cells; in other cases it was either congested or pale or bloodless.

The *kidneys*, when normal macroscopically, invariably showed changes microscopically, showing inflammatory and degenerative changes, intense glomerulo- and parenchymatous nephritis.

The *spleen* varied; it was sometimes congested, or exhibited hyaline degeneration of the arteries.

The *lungs* showed marked evidence of acute catarrhal, or catarrhal and interstitial pneumonia.

Dr. Hawkins concluded by dealing with the treatment of the disease.

CERTIFICATION AND CLASSIFICATION OF "DIARRHŒA" DEATHS.

FURTHER REPORT OF THE COMMITTEE
APPOINTED BY THE HOME COUNTIES BRANCH OF THE
INCORPORATED SOCIETY OF MEDICAL OFFICERS
OF HEALTH.

Since our previous report* we have received additional answers to our circular-letters issued in 1899, addressed to medical officers of health, which make the total number of replies amount to 604.

We have now to report that your recommendation to the Council of our Society to ask the Royal College of Physicians to appoint a committee to consider the question was acted upon, and that the College complied with the request. Their committee drew up the report hereto appended.†

The report was unanimously adopted by the Royal College of Physicians on January 25th, 1900. We have now, therefore, an authoritative declaration that the disease known under various synonyms as "diarrhœa" is a *general disease of specific character*, as was pointed out by the late Dr. Ballard in his classical report on diarrhœa to the Local Government Board in 1888; and, as was urged by him, a *specific name* has now been authoritatively assigned to it.

In future the only authorized names to be used in certifying deaths from this disease are *epidemic enteritis*, *zymotic enteritis*, or *epidemic diarrhœa*, and all other synonyms are to be entirely discarded.

The way has thus been cleared for further action in promoting uniformity in certification and classification of "diarrhœa" deaths.

The Registrar-General has at once acted upon the decision of the College, and has issued fresh instructions to all the district registrars of births and deaths for their guidance in registering "diarrhœa" deaths, which are as follow:

"DIARRHŒA.—This should be registered as *the cause of death* only when diarrhœa is written alone, or when it is coupled with some *ill-defined* cause, such as atrophy, debility, marasmus, thrush, convulsions, teething, old age, or senile decay. In addition to deaths ascribed to diarrhœa, deaths from *intestinal* or *enteric catarrh*, from *gastro-intestinal* or *gastro-enteric catarrh*, or from *epidemic enteritis*, or *zymotic enteritis* must be included under this

* See PUBLIC HEALTH, xi., p. 539 (May, 1899). † See p. 688 of this issue.

heading; but deaths from *gastric catarrh*, *gastro-enteritis*, or *enteritis* must be excluded from this heading."

We are, however, strongly of opinion that when such terms as *gastro-enteritis*, *muco-enteritis*, *gastric catarrh*, etc., appear in death-certificates, medical officers of health should make inquiry of the certifying practitioners as to whether they considered that the illness which had caused the deaths was of the nature of epidemic or zymotic enteritis. If the reply is in the affirmative, the deaths should be entered under "Diarrhoea," and be included in the diarrhoea and zymotic death-rates, and it should be stated when such deaths are so included; but if the illness is found *not* to be of that nature, then the deaths should be entered under the heading "Enteritis" among Diseases of the Digestive System, or under "All other Causes."

We believe that it would be quite possible for each medical officer of health to carry out this system in his own district, although it would not be practicable for the Registrars-General to make such inquiries all over the kingdom.

Such terms as *cholera*, *dysentery*, *choleraic* or *dysenteric diarrhoea*, etc., should be included in the diarrhoea and zymotic death-rates. When *diarrhoea* is coupled with some *well-defined* cause of death in death-certificates, such as phthisis, tuberculosis, tubercular peritonitis, pneumonia, cancer, syphilis, etc., the deaths should not be included under "diarrhoea."

We recommend that a separate column for all deaths certified under the name of *epidemic enteritis* or *zymotic enteritis* should be included under Specific Febrile Diseases in statistical tables of causes of death.

We suggest that in carrying out all these recommendations for the classification of "diarrhoea" deaths, attention should not as a rule be paid to the position of the names of the diseases in death-certificates as the *primary* or *secondary* cause of death, seeing that this distinction is employed so arbitrarily by different medical practitioners as to be quite worthless for the purposes of classification.

In our previous report published in PUBLIC HEALTH for May, 1899, we stated four points which we were of opinion required to be considered and definitely determined. They were:

1. To assign a definite name to this specific form of diarrhoea;
2. To decide what other allied terms which have hitherto been employed in death-certificates shall be included under the heading "Diarrhoea" in classification of deaths;

(We recognise the necessity, from long usage, of the name "Diarrhoea" being retained as a heading in death-statistics.)

3. When these points shall have been determined, to take steps to bring about their general adoption by the medical profession in death-certification; and

4. To approach the Local Government Boards of England, Scotland, and Ireland, with a view to their issuing definite and uniform instructions with reference to this subject to all medical officers of health.

The first two of these questions having been disposed of by the action taken by the Royal College of Physicians and the Registrar-General, we now come to the third.

After full consideration, we are of opinion that the most effectual way to draw the attention of medical practitioners to the subject, and to secure the much-needed *uniformity in certification* of deaths from the disease in question, will be to issue a circular embodying the authoritative pronouncements of the Royal College of Physicians, and urging that their recommendations should be invariably acted upon. Such circular should be sent by the Incorporated Society of Medical Officers of Health to every registered medical practitioner in the United Kingdom.

But if the Society be not willing to bear the cost of so doing, a less expensive but much less effectual plan would be to send copies of the circular to the honorary secretary of every Branch of the British Medical Association, with a request that he would distribute them to all the members of his Branch, and to ask for the co-operation of the Council of the Association.

Endeavours should be made to have this circular inserted in an early number of every medical and public health paper published in the kingdom.

With the object of securing *uniformity in classification* of deaths from "diarrhoea," we further recommend that a circular should be sent to every medical officer of health setting forth the before-mentioned instructions of the Registrar-General, together with our recommendations as to classification, and urging them to strictly adhere to them in the compilation of their statistics, and to endeavour to influence all medical men practising in their districts to certify in accordance with the authoritative decisions of the Royal College of Physicians.

With regard to the fourth point we recommend that our Society should be requested to address communications to the Local Government Boards of England, Scotland, and Ireland, forwarding to them a printed account of the whole of the proceedings in connection with this subject, and asking them to issue definite and uniform instructions with reference to the *classification* of "diarrhoea" deaths to all medical officers of health.

We also recommend that a copy of the proceedings should be sent to the Registrars-General of England, Scotland, and Ireland.

We now make the further recommendation that a copy of these proceedings should be addressed to every lecturer on and teacher of medicine and hygiene in the recognised schools of medicine in the United Kingdom, in the belief that the promotion of uniform instruction in the certification and classification of "diarrhoea" deaths which would be thus encouraged would materially forward the end we have in view.

We have prepared the following circulars in accordance with our recommendations:

THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

MEMORANDUM ON CERTIFICATION OF "DIARRHOEA" DEATHS.

To Registered Medical Practitioners in England, Scotland, Ireland and Wales.

Much confusion having arisen from the numerous synonyms, unauthorized by the Royal College of Physicians, which for some years past have been increasingly used in the certification of deaths from "diarrhoea"—the "epidemic diarrhoea" of the *Nomenclature of Diseases*—the Incorporated Society of Medical Officers of Health is desirous of calling the attention of all medical practitioners to a decision which has been arrived at by that College authorizing the use of the term "epidemic enteritis" (or, if preferred by the practitioner, "zymotic enteritis") as a synonym for epidemic diarrhoea (*Nomenclature of Diseases*, p. 9, ed. 1896); and urging the entire disuse, as synonyms of epidemic diarrhoea in medical certificates of death, of such terms as "gastro-enteritis," "muco-enteritis," "gastric catarrh," etc.

The confusion arising from the present practice in certification so seriously vitiates the accuracy of all statistics with regard to this disease, which is recognised by the Royal College of Physicians to be a general disease of specific character in the same sense as enteric and other fevers, that this Society desires to strongly urge medical men to strictly adhere to these authoritative decisions which the College has now published.

In future the only authorized names to be used in certifying deaths from this disease are: *epidemic enteritis*, *zymotic enteritis*, or *epidemic diarrhoea*, and all other synonyms are to be entirely discarded.

The late Dr. Ballard showed that this specific disease occurs in persons of all ages, and that it may happen in other than epidemic seasons, under which circumstances the Society would suggest the advisability of the employment of the alternative term, *zymotic enteritis*.

C. D. } *Hon. Secretaries.*
E. F. }

A. B., *President.*

THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

MEMORANDUM ON CLASSIFICATION OF "DIARRHOEA" DEATHS.

To Medical Officers of Health.

The Registrar-General has issued fresh instructions respecting registration of "diarrhoea" deaths to all district registrars of births and deaths, which are as follow:

"DIARRHOEA.—This should be registered as the cause of death only when diarrhoea is written alone, or when it is coupled with some ill-defined cause, such as atrophy, debility, marasmus, thrush, convulsions, teething, old age, or senile decay. In addition to deaths ascribed to diarrhoea, deaths from *intestinal* or *enteric catarrh*, from *gastro-intestinal* or *gastro-enteric catarrh*, or from *epidemic enteritis* or *zymotic enteritis*, must be included under this heading; but deaths from *gastric catarrh*, *gastro-enteritis*, or *enteritis*, must be excluded from this heading."

When, however, such terms as *gastric catarrh*, *gastro-enteritis*, *muco-enteritis*, etc., appear in death certificates, medical officers of health should make inquiry of the certifying practitioners as to whether they considered that the illness which had caused the deaths was of the nature of *epidemic* or *zymotic enteritis*. If the reply is in the affirmative, the deaths should be entered under "diarrhoea," and be included in the diarrhoea and zymotic death-rates, and it should be stated when such deaths are so included; but if the illness is found *not* to be of that nature, then the deaths should be entered under the heading "Enteritis," among Diseases of the Digestive System, or under "All other Causes."

Such terms as *cholera*, *dysentery*, *choleraic* or *dysenteric diarrhoea*, etc., should be included in the diarrhoea and zymotic death-rates.

When *diarrhoea* is coupled with some well-defined cause of death in death certificates, such as phthisis, tuberculosis, tubercular peritonitis, pneumonia, cancer, syphilis, etc., the death should not be included under "diarrhoea."

A separate column for all deaths certified under the name of *epidemic enteritis* or *zymotic enteritis*, should be included under Specific Febrile Diseases in statistical tables of causes of death.

Attention should not as a rule be paid to the position of the name "diarrhoea" in death certificates as the primary or secondary cause of death, since this distinction is employed so arbitrarily by different medical practitioners as to be quite worthless for the purpose of classification.

Inasmuch as uniformity of classification is the only basis on which reliable and comparable statistics can be founded, the Society most earnestly requests that you will compile your statistics so as to accord with these recommendations.

The Society has addressed a circular to all registered medical practitioners in the United Kingdom, a copy of which is enclosed, and would ask you to use your influence with the medical men in your district to induce them to comply with the directions of the Royal College of Physicians respecting certification of "diarrhoea" deaths in any way which may appear best to you.

The Society would suggest that much may be done in that direction by letters to or personal interviews with medical practitioners, or by

bringing the matter prominently before any medical society there may be in your district.

Should you wish it, further details respecting what has been done in the matter will be supplied to you on application to the Honorary Secretaries of the Society at 197, High Holborn, London, W.C.

C. D. } *Hon. Secretaries.*
E. F. }

A. B., *President.*

ALFRED ASHBY. } *Members of the Committee appointed by*
W. T. G. WOOD- } *the Home Counties Branch of the Incorporated*
FORDE. } *Society of Medical Officers of*
WILLIAM GRUGGEN. } *Health.*

May 9th, 1900.

ROYAL COLLEGE OF PHYSICIANS.

REPORT OF THE DIARRHOEA NOMENCLATURE COMMITTEE.

COMMITTEE appointed by the College on July 27th, 1899:

To consider the *Certification and Classification of Deaths from Diarrhoea*, in response to a representation made by the Incorporated Society of Medical Officers of Health.

Members of the Committee.

Dr. Payne.
Dr. Corfield. Dr. F. W. Andrewes.
Dr. Seaton. Dr. J. F. W. Tatham.

Your Committee beg leave to report as follows:

(1) We find on inquiry, and especially from evidence furnished by Dr. Tatham, of the General Register Office, and by other members of the Committee, that many different terms are employed to designate the disease officially known as "Epidemic Diarrhoea," whereby its specific character is in danger of being ignored and great confusion ensues.

(2) The results of this confusion are serious and important, since this form of diarrhoea causes a large portion (about one-fourth) of the deaths attributed to zymotic diseases.

We gather, from a statement furnished to us by Dr. Tatham, that his main difficulty lies in the impracticability of picking out, from the long list of fashionable but unauthorized synonyms, all the deaths which in their nature are indistinguishable from deaths by diarrhoea, and which ought to be called by the

authorized name. At present he classes as diarrhoea (and therefore under zymotic disease) deaths certified as follows:

Diarrhoea.
Epidemic diarrhoea.
Dysentery and dysenteric diarrhoea.
Intestinal (or enteric) catarrh.
(Gastro-intestinal (or gastro-enteric) catarrh.

But the following he classes not as diarrhoea, but as diseases of the alimentary canal (thus excluding them from the zymotic class):

Gastro-enteritis.
Muco-enteritis.
Gastric catarrh.

This second group of cases ought, he points out, for the most part, to be regarded as identical with epidemic diarrhoea, inasmuch as their age-incidence, fatality-curves, and general epidemiological characters correspond closely with those of that disease.

In London, during the thirteen weeks ending with September last, the deaths medically certified as due to diarrhoea numbered 3,798; but in addition, there were registered 2,289 deaths from enteritis (of which 1,880 were from gastro-enteritis), the bulk of which ought certainly to be attributed to epidemic diarrhoea.

The different counties of England vary very widely in the proportions of deaths returned respectively as due to diarrhoea and to enteritis, presumably in accordance with local fashion. Thus, for England and Wales as a whole, the diarrhoea death-rate amongst infants appears as 25 per thousand births, the enteritis death-rate as 12 per thousand. But in East Yorkshire the proportions are 35 per thousand from diarrhoea, and 9 per thousand from enteritis; while in Cumberland they are 10 per thousand from diarrhoea, and 14 per thousand from enteritis.

Dr. Tatham further points out that the fashion of discarding the familiar name "diarrhoea," in favour of such unsatisfactory and unauthorized names as "gastro-enteritis," "gastric catarrh," etc., is of comparatively recent growth. But during the last fifteen, and especially during the last ten years, the fashion has prevailed so extensively as entirely to vitiate the diarrhoea mortality returns, which, for sanitary purposes, are of exceptional importance.

We therefore consider that the present confusion of terms renders it impossible to determine accurately the prevalence

of the disease in special places or at special times, the extent to which it influences public health in general, and the effects produced by sanitary measures.

(3) We find that there is a widespread objection on the part of medical practitioners to the employment of the term "diarrhoea," in certifying the cause of death. The term is generally held by the public to imply a mild disease, insufficient by itself to cause death. This fact explains the reluctance of the practitioner to employ it on the death-certificate, since it may be conceived to imply a stigma upon his own capacity. It is therefore desirable, if possible, to substitute for it some name equally accurate, but conveying to the public the idea of a more serious affection. But we regard it as essential that the idea of specificity, intended to be conveyed by the term "epidemic," should be retained.

(4) Hence, we would recommend the College to authorize the use of the term "epidemic enteritis" (or, if preferred by the practitioner, "zymotic enteritis") as a synonym for epidemic diarrhoea (*Nomenclature of Diseases*, p. 9, ed. 1896). And we would further recommend that the College should urge the entire disuse, as synonyms of epidemic diarrhoea in medical certificates of death, of such terms as "gastro-enteritis," "muco-enteritis," or "gastric catarrh."

Unanimously approved and adopted by the Committee,
November 20th, 1899.

J. F. PAYNE,
Chairman.

A NEW FORM OF ISOLATION WARD.*—At the instance of M. Roux a system of separate rooms for each case of diphtheria has been introduced into the new pavilion in connection with the Children's Hospital in Paris. There is no large ward, or, rather, the large ward is divided up into a number of small sections by glass partitions. A passage runs down the centre, and on each side are the rooms. For acute cases there is a partition between each bed, but for convalescent cases there are from three to six beds in a compartment. The small compartments appear from the plans to have a floor-space of 10 feet by 5 feet 8 inches, and are of good height. The larger compartments have 100 feet floor-space per bed. Another pavilion is reserved for cases of measles, and each bed is not placed in an isolated chamber, but a screen of iron and glass is placed between each bed. It does not come down quite to the floor, and extends only about 4 feet above the bed. The two pavilions are intended to accommodate ninety children, and the cost is about £200 per bed.

* *La Presse Médicale*, viii., No. 15, February 21st, 1900.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

SPECIAL COUNCIL MEETING.

CERTIFICATION AND CLASSIFICATION OF DIARRHOEA DEATHS.—A special meeting of the Council of the Society was held on Friday, May 11th, 1900, to consider the report from the Home Counties Branch* on this subject.

The report having been received, Dr. SHADWELL moved, and Dr. WOODFORDE seconded, a motion to adopt recommendation No. 1, viz., To forward a circular to every medical practitioner in the United Kingdom drawing attention to the decision of the Royal College of Physicians.

In the course of the discussion which ensued, Dr. ALLAN, the Hon. Secretary, stated that the cost of sending out such circulars would amount, including postage (halfpenny rate), envelopes, printing, and labour, to not less than £100.

Dr. WOODFORDE intimated that the Home Counties Branch would be prepared to contribute half the expense, to the extent of £50.

An amendment was moved by Dr. R. DUDFIELD, and seconded by Dr. DIXON, that a communication be addressed to local authorities in the United Kingdom, forwarding copy of suggested circular to medical practitioners, and stating that further copies could be obtained from the Society for circulation in their district.

A further amendment was moved by Dr. SYKES, and seconded by Dr. BOSTOCK HILL, that the further consideration of the report be adjourned, that it be printed in the next number of the *Journal*, and that it be sent to the Branches for consideration and report. This amendment was adopted by the Council.

On the motion of the PRESIDENT, seconded by Dr. SYKES, it was unanimously resolved that the best thanks of the Council be accorded to Dr. Ashby and the Home Counties Branch for the great trouble they have taken in the matter.

Metropolitan Branch.—A meeting of this Branch was held at No. 197, High Holborn, W.C., on Friday, May 11th, 1900. Present: Dr. Dixon (President) in the Chair, Drs. F. J. Allan, G. P. Bate, L. T. F. Bryett, Reginald Dudfield, Oliver Field, E. Gwynn, S. R. Lovett, G. Millson, J. Priestley, H. W. Roberts, J. F. J. Sykes, and G. E. Yarrow.

The minutes of the last meeting were read, approved, and signed by the Chairman.

The Hon. SECRETARY submitted a letter from Mr. W. Green intimating the death of Dr. Glaister, Medical Officer of Health for Clerkenwell, a member of the Branch.

Resolved unanimously that the Hon. Secretary be requested to communicate with the widow of the late Dr. Glaister, and convey to her the condolence of the Branch in her bereavement.

The Branch then proceeded to consider the Factory and Workshops Bill introduced into the House of Commons by Mr. Chaplin. After discussion,

* See p. 683 of this issue.

It was resolved that no action be taken thereon.

The draft schemes prepared by the Commissioners under the London Government Act, 1899, relating to existing officers and certain other matters, were considered, but no action was taken.

Dr. SYKES brought before the Branch particulars of a case of seizure of unsound meat.*

The PRESIDENT thanked Dr. Sykes for the trouble he had taken in bringing the matter before them.

North-Western Branch.—The ordinary monthly meeting of this Branch was held in the Senate Room, University College, Liverpool, on Friday, May 11, at 4 p.m. The following members were present: Drs. Hayward (President), Garstang, Graham, Harris, Haworth, Hope, Peck, Pilkington, Sergeant, Vacher, Wheatley, Meredith Young, and Ralph Young; also Drs. Boyce and Grünbaum.

The minutes of the last meeting were confirmed.

A letter was read from Dr. Berry.

The members were then shown over the Thompson-Yates laboratories by Drs. Boyce and Grünbaum.

The meeting terminated with a cordial vote of thanks to Drs. Boyce and Grünbaum.

Home Counties Branch.—A meeting of the Branch was held at the Holborn Restaurant on April 26th. There were present: Drs. Tew (in the Chair), Foulerton, Willoughby, Woodforde, Sanders, Gruggen, Kenwood, Seaton, Jackson (Visitor), and Shadwell (Hon. Secretary).

The minutes of the last meeting were read and confirmed.

Letters regretting inability to be present were received from Drs. Skinner and Thresh.

It was decided to hold a special meeting during the month of May, to receive the report of the Committee appointed to consider the Certification and Classification of Deaths from Diarrhoea.

A paper on "Prophylactic Inoculation against Typhoid Fever" was read by ALEX. G. R. FOULERTON, Esq., F.R.C.S., who dealt with the subject both from the experimental and practical points of view.

An interesting debate followed, which was taken part in by Drs. Kenwood, Sanders, Seaton, Willoughby, Tew, and Shadwell.

The reader of the paper was much complimented for the manner in which he had dealt with the subject, and heartily thanked for his paper.

The meeting then adjourned.

A special meeting of the Branch was held on May 9th to receive the report of the Special Committee on the Certification and Classification of Deaths from Diarrhoea. There were present: Drs. Tew (in the Chair), Gruggen, Skinner, Ashby, Seaton, Richards, Woodforde, and Shadwell (Hon. Secretary).

Dr. ASHBY read the Committee's report,† which was then discussed by most of the members present, who expressed their admiration for the way in which the Committee had treated the subject.

* A report of the case will appear in our next issue.

† See p. 683 of this issue.

Dr. ASHBY proposed, and Dr. SEATON seconded, the following resolution:

That the report of the Committee on the Certification and Classification of Diarrhoea be now received and adopted, and that it be referred to the Council of the Incorporated Society of Medical Officers of Health for their consideration, with the expression of the earnest desire of the Home Counties Branch of the Society that the Council may decide to act upon the recommendations of the report.

The Hon. Secretary was instructed to send a copy of this resolution to the Secretary of the Incorporated Society.

Dr. ASHBY pointed out that the adoption of the report would involve the Society in considerable expense.

The meeting was of opinion that the recommendations of the Special Committee were so important that the expense, though heavy, should be incurred, and that if needs be the Branch should help in this matter.

Dr. SEATON proposed, and Dr. SKINNER seconded:

That this Branch contribute a sum not exceeding £50 towards the expenses incurred in carrying out the recommendation of the Special Committee.

Dr. TEW proposed, and Dr. SEATON seconded, a vote of thanks to the Committee for the way in which they had performed their duties.

Dr. ASHBY returned thanks on behalf of the Committee in suitable terms.

Scottish Branch.—A meeting of this Branch was held in the Royal Hotel, Edinburgh, on Saturday, May 19th, 1900. Present: Dr. Matthew Hay (President), in the Chair, Drs. Campbell Munro, McVail, Maxwell Ross, Chalmers, Wilson, Leslie Mackenzie, Nasmyth, McDonald, McNeill, and Templeman.

The minutes of the meeting held at Glasgow on February 17th were read and approved.

Apologies were intimated from Drs. Bruce, Oliver, and Robertson.

The SECRETARY read a letter from the Secretary of the Local Government Board with reference to their memorial regarding the census of 1901. He also read replies from various members to the circular of the Branch requesting the definition of "house" and "family." After considerable discussion, the meeting was of opinion that no better definition could be obtained than that in the Reform Act of 1884, viz., that "the expression 'dwelling-house' means any house or part of a house occupied as a separate dwelling," and that with proper examples to enumerators this definition would meet the requirements of the case. It was remitted to the Council, with powers to communicate with the Registrar-General, and take what steps they consider necessary to have the recommendation of the Branch carried into effect.

The meeting then took into consideration the recommendations of the Public Health Committee of the General Medical Council regarding the course of study for the diploma in public health. It was resolved to transmit to Dr. Bruce the opinion of the meeting regarding these. It was unanimously resolved to recommend that Rule 1 (1) be maintained. In regard to the proposed modification of Rule 1 (2), it was agreed that the words "after obtaining a registrable qualification,

either" should be deleted; that after the word "attended" in the third line the words "during six months" should be inserted; that the word "sufficient" in line three should be deleted; and that all the words after "taught" should be deleted. On the consideration of the proposed modification of the first paragraph of Rule 1 (3) Dr. McVAIL, seconded by Dr. MUNRO, moved that the requirement should be that "every candidate shall have produced evidence that he has practically studied the duties of a medical officer of health for at least fifteen hours or three days a week for thirteen weeks included in any consecutive six months."

The PRESIDENT, seconded by Dr. WILSON, moved that the recommendation of the committee of the General Medical Council should be amended by the insertion of the words "for six months" after "studied" on line three, and that the word "out-door" on the same line should be deleted.

On a vote being taken, the President's amendment was carried by five votes to three.

The meeting was further of opinion that it should be understood that the laboratory course and the practical work under a medical officer of health might be taken simultaneously.

Dr. Leslie Mackenzie's paper on "Methods of Disinfection" was considered, and gave occasion to a very interesting discussion, taken part in by nearly all the members present.

Dr. MUNRO drew attention to the Bill for the Superannuation of Medical Officers of Health and Sanitary Inspectors in England.

It was agreed to support the Bill as far as possible, and it was remitted to Dr. Munro to take any steps which might be necessary to that end.

MEETINGS FOR JUNE.

June 8th, North-Western Branch, at Manchester.

June 20th, Southern Branch, at Emsworth, Hants.

June 30th, Annual Provincial Meeting of the Society, at Brighton.

APPEAL *re* SKRIMSHIRE.—We are pleased to announce that this lad, on whose behalf we issued an appeal in our last issue, was successful at the last election for the Royal Masonic Institution for Boys.

SERUM TREATMENT OF LEPROSY.—Dr. Ashburton Thompson, in a "Report on Leprosy in New South Wales during 1898," describes the results obtained by the use of a serum prepared according to the formula devised by Don Luan de Dios Carrasquilla, and reported in the *Gaceta Medica de Costa Rica*. The serum is reported to have been used with much success at Bogota. The serum was prepared in a manner similar to that followed in the preparation of anti-toxin for diphtheria, horses being used. Two lepers were inoculated with the serum, but the subsequent histories did not confirm the results reported by Carrasquilla, and Dr. Thompson concluded that the "method was inefficacious."

* See PUBLIC HEALTH, xii., p. 438 (March, 1900), and p. 539 (May, 1900).

REVIEW OF RECENT BACTERIOLOGY.

THE SMEGMA BACILLUS.—Reference was lately made in these pages* to the occurrence in London sewage of certain "acid-fast" bacilli which resembled *B. tuberculosis* in their resistance to decolouration by mineral acids after staining with warm carbol-fuchsin solution. Amongst the bacilli of this sort which are likely to be found in sewage is more particularly the smegma bacillus, and Dahms† has compiled a very full account of the characteristics of this organism. The smegma bacillus is not found only in the region of the anus and genital organs in both sexes, and in the cerumen of the ears, but is widely distributed over the whole cutaneous surface, and has also been found in the sputum, on the fur coating the tongue, and on the teeth. Dahms has also isolated the bacillus from the surface of clothing which has been in immediate contact with the skin. In order to isolate the bacillus, use may be made of agar slants, the surfaces of which have been smeared with fresh human blood; for subsequent subcultures Löffler's horse-serum, glycerine-agar, agar, peptone, beef broth, potato, or gelatin may be employed. For the differentiation of the smegma bacillus from *B. tuberculosis* two good staining methods are available. In the method recommended by Grethe the cover-glass film is stained with warm carbol-fuchsin in the usual way; it is then washed in water and immersed in a saturated solution of methylene blue in absolute alcohol. With this method *B. tuberculosis* returns the red staining, but the smegma bacillus is stained blue. The other method is that of Bunge and Tranterroth, in which the cover-glass film, having been prepared in the usual way, is immersed in absolute alcohol for twenty-four hours. If at the end of that time the film is stained with warm carbol-fuchsin, it will be found that the smegma bacillus is readily decoloured by immersion for two minutes in dilute sulphurous acid, and can then be stained by an aqueous solution of methylene blue, whereas *B. tuberculosis* after undergoing similar treatment remains of a bright red colour.

NEW METHOD FOR EXAMINING SPUTUM FOR *B. TUBERCULOSIS*.—Amongst the difficulties which occur in the bacteriological diagnosis of pulmonary tuberculosis is that arising in cases in which the expectoration is profuse and the bacilli present are few, under which conditions an almost endless search through cover-glass specimens prepared in the ordinary way may have to be undertaken. The usual method adopted for obviating this difficulty is to examine the sediment thrown down from the sputum after the pus and mucus in it have been dissolved up in a strong solution of caustic potash. This proceeding is, however, open to the objection that the preliminary treatment with caustic potash is liable to modify considerably the characteristics of the tubercle bacillus itself, and, further, it is difficult to fix the sediment thus obtained satisfactorily to the cover-glass. Lannoise and Girard‡ suggest the following alternative method as one giving better results. It is found

* See *Review of Recent Bacteriology*, PUBLIC HEALTH, vol. xii., p. 638 (May, 1899).

† *The Journal of the American Medical Association*, vol. xxxiv., Nos. 16 and 17, April 21st, 1900.

‡ Communication to the Congress on Tuberculosis at Naples, April 25th, 28th, 1900.

that a solution of alkaline hypochlorites of soda or potash acts as a good solvent of the pus and mucus, and does not in any way interfere with the subsequent staining of the tubercle bacillus. In practice the sputum is mixed with ten times its volume of diluted eau de Javel,* and allowed to stand for twenty-four hours, at the end of which time the sediment is stained and examined for bacilli. The sediment may also be obtained by centrifugation of the diluted sputum, after which all the clear supernatant fluid, except 2 or 3 c.c., is poured off. To the residue 5 or 6 drops of normal soda solution are added to convert any free chlorine present into sodium chloride, and the sediment is added to a large volume of distilled water and again centrifugated. In the sediment so obtained one can not only readily demonstrate the tubercle bacilli if present, but various histological elements of assistance in forming a diagnosis will often be seen.

THE ENTEROCOCCUS IN CHOLERA NOSTRAS.—Galliard and Monod† record the case of a man, aged thirty, admitted into hospital with well-marked cholera nostras, who died after a week's illness, during which symptoms of a severe type were developed. The post-mortem examination showed signs of congestion of the large intestine and acute cystitis. Bacteriological examination of the contents of the intestines showed that only two species of bacteria were present in the faecal matter, *B. coli communis*, and a capsulated diplococcus, which was identified with the enterococcus described by Tiercelin. This diplococcus occurred in single pairs or in pairs arranged in short chains. Pure cultures of the diplococcus were obtained from the urine and from the heart blood, whilst cultures from the liver, spleen, and kidneys yielded the same organism and *B. coli communis*.

MENINGITIS DUE TO INFECTION OF ENTERIC FEVER.—Fernet and Lacapère‡ record the case of a young woman admitted with enteric fever in whom symptoms of meningitis, including headache, delirium, strabismus, and alternate flushing and pallor of the face developed. The post-mortem examination showed, in addition to the characteristic ulceration of the intestines, a turbid effusion in the meningeal cavity and marked oedema of the cerebral substance. From the turbid fluid the *B. typhosus* was isolated, and its identity proved by the usual tests, including the specific serum reaction.

THE INFLUENZA BACILLUS OF PFEIFFER.—Rosenthal§ questions the causal relation of Pfeiffer's organism (*Cocco-bacillus haemophilus*) to influenza. Rosenthal made bacteriological examinations of the sputum in nineteen cases of broncho-pneumonia in young children. Pfeiffer's cocco-bacillus was identified in fifteen of these cases: in two it was present in pure culture; in the remaining thirteen it was associated with other bacteria, such as the pneumococcus, *Streptococcus pyogenes*, and a diplo-streptococcus. There was no reason to suppose that any of these cases were in any way connected with influenza, not a single case of the latter being known of in Paris during the time that the investigations were carried on. Other pathologists have also found the cocco-bacillus in pulmonary cavities and in bronchitic sputum in cases

* Eau de Javel is prepared by adding sodium carbonate to a solution of bleaching-powder as long as any precipitate appears, and then filtering.

† *Bulletins de la Société Médicale des Hôpitaux de Paris*, 3^e série, No. 13, April 12th, 1900.

‡ *Ibid.*, 3^e série, No. 14, May 3rd, 1900.

§ *Comptes Rendus de la Société de Biologie*, tome lli., No. 11, March 23rd, 1900.

in which there was no suspicion of influenza. The author concludes, therefore, that the cocco-bacillus which Pfeiffer and others have described as occurring in the sputum of patients with influenza is there merely accidentally, and not as the cause of the disease.

ANALYTICAL NOTES.

ESTIMATION OF CHLORAL HYDRATE IN TOXICOLOGICAL WORK. RUSSWURN.—Chloral hydrate only distils with difficulty in a current of steam. The substance should be made alkaline and then distilled; a portion of the distillate is boiled with alcoholic potash under an inverted condenser to split off the chlorine, which is then determined as usual.—*Analyst*.

DETERMINATION OF MORPHINE IN TOXICOLOGICAL CASES. RUSSWURN.—The author modifies the usual process slightly so as to recover the alkaloid in crystalline condition. The original ammoniacal solution is extracted with warm amyl alcohol, the latter is shaken with hydrochloric acid, the aqueous liquid is supersaturated with ammonia, and the solution is extracted with chloroform. The chloroform is evaporated till only a few c.c. are left, mixed with 50 grammes of petroleum spirit, and set aside for twenty-four hours. The liquor is poured off, the morphine crystals are dried first in the air, then at 80° or 90° C., and finally weighed.—*Analyst*.

A NEW REAGENT FOR ALKALOIDS, ESPECIALLY OPIUM BASES.—MECKE.—A 0.5 per cent. solution of selenious acid in strong sulphuric acid gives characteristic colour reactions with colchicine, veratrine, and more particularly with the alkaloids of opium. The reagent strikes a conspicuous green tint even with 0.005 milligramme of morphine and codeine, and the reaction is therefore more delicate than its predecessors, appearing immediately and in the cold. When the colours produced by sulphuric acid alone are red, they are very liable to be masked by the brown shade formed by the action of the acid upon extractive matters if the alkaloids are impure; the green yielded by selenious acid in presence of codeine and morphine, on the other hand, is distinctly visible even if the solution turns brown.—*Analyst*.

POISONING BY FOOD CONTAINING TIN.—Professor Gunter reports a case of poisoning by tin, which resulted from eating some preserved herrings, the symptoms being great pain in the stomach, oppression, and loss of appetite. The tinned iron vessel which had contained the herrings was found to have been extensively corroded; the pieces of herring showed the presence of tin to the amount of .103 per cent.; .031 per cent. of the metal was also found in the herring liquid. The dangers that attach to the use of metal cases in the packing of food have already been drawn attention to in the *British Food Journal*. In some parts of the Continent, and more particularly in Holland, the interior of the tin is protected from corrosion by means of insoluble varnish. Food containing vinegar, or which is of an acid character, should not be cooked in the containing tins. Tinned vegetables of an acid nature, which have occasioned the poisoning of persons who have partaken of them, have been found to contain a large amount of tin. The vegetables in question had been cooked in the tin in which they had been preserved, and thus enough tin was dissolved to produce the poisonous effects.—*British Food Journal*.

DRUGGED FOOD.—The Public Analyst to the Berkshire County Council reports that he has examined certain articles of food, with the object of ascertaining whether they contained preservatives or artificial colouring matters. He found that a sample of walnut pickles, five samples of British wines, a vinegar of British manufacture, a sample of dried apricots, and one of anchovy paste, all contained traces of a sulphite which was probably present as calcium bisulphite. The percentage of sulphite calculated as sulphurous acid was, however, small, being under .005 per cent. It had, no doubt, been added to prevent secondary fermentation. The anchovy paste had been coloured with oxide of iron; the red-currant wine and strawberry syrup both contained salicylic acid. The bloater paste had been coloured with iron oxide or red ochre. This information will no doubt be received with pleasure by those who have a liking for the above-mentioned delicacies. It is earnestly to be hoped that if, as a result of the deliberations of the Committee on Preservatives and Colouring Matters, the unfortunate conclusion should be arrived at that the sale of such mixtures must be allowed, their sale will only be permissible under severe restrictions, and subject to the fullest information being given to the purchaser.—*British Food Journal*.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

BEFORE RIDLEY AND BIGHAM, J.J.

May 16th, 1900.

THOMAS v. VAN ON.

This was an appeal by way of a special case from the decision of the magistrate sitting at the Thames Police Court, the question raised being whether, before a magistrate acting under Section 47 of the Public Health (London) Act, 1891, condemns an article as being unsound or unwholesome, or unfit for the food of man, it is necessary that the magistrate should have before him evidence that the goods were intended for the food of man. In July of last year an application was made to the magistrate to condemn 117 tubs of strawberries. The magistrate refused the application on the ground that there was no evidence before him that the strawberries were intended for the food of man. A rule nisi was then obtained directing him to state a case, and this rule was made absolute on January 11th, 1900. From the case as stated the following facts appeared: The appellant was the medical officer of health for the district of Limehouse. On July 17th, 1899, he saw a van in Devonport Street, Ratcliffe, containing the fruit, which upon examination he found to be unsound and unwholesome and unfit for the food of man. The strawberries were sent to the defendant from Holland under contract with one Van Namen, and on arrival in London the defendant had ordered a carman to convey them to Messrs. John Moir, Limited. The defendant admitted that the strawberries were unfit for the food of man. The medical officer of health, acting under Section 47 of the

Public Health (London) Act, 1891, caused them to be brought before the magistrate, who refused to condemn them on the ground that there was no evidence that the fruit was intended for the food of man, or sold or exposed for sale or deposited for the purpose of sale at the time of the seizure. He held that when Messrs. John Moir refused to take the fruit any intention of applying them for the purposes of food or sale was exhausted. In the absence of such evidence he held that he had no jurisdiction to make any order of condemnation.

R. D. Muir, for the appellant, contended that there was ample evidence that the strawberries were intended for the food of man, being deposited in a van for purpose of sale; that the defendant was unaware that Messrs. John Moir had refused them, and that the intention to sell continued after such refusal. He further argued that the question whether the goods were exposed for sale was not one for the magistrate, but for the medical officer of health. He cited *White v. Redfern* (5 Q.B.D., 15), *Vintner v. Hind* (10 Q.B.D., 63), *In re Bater and Birkenhead Corporation* (1893, 2 Q.B., 77).

RIDLEY, J., in giving judgment, said that Section 47 of the Act defined the powers of the medical officer of health. He might enter upon the premises of the defendant and inspect and examine any article intended for the food of man. It was obvious that as a preliminary to putting his powers in force the medical officer of health must make up his mind whether the articles examined came within the description in Section 47—that is, whether they were intended for the food of man or exposed for sale. Having made up his mind on that question, his duty was to examine the articles. If he found them unsound or unwholesome or unfit for the food of man, then, and not till then, the functions of the magistrate came into operation. The magistrate must then decide whether the articles were in fact unsound, unwholesome, or unfit for the food of man, and having decided that, his further duties were merely ministerial. The question whether the articles were intended for the food of man was, at this stage of the proceedings, immaterial, and did not become material until Subsection 2 of Section 47 came into operation and the person exposing the goods for sale was charged on summons for an offence under the Act. The case of *White v. Redfern* (5 Q.B.D., 15) was properly decided, and covered this case in principle.

BIGHAM, J., concurring, the case was remitted to the magistrate with an intimation that the strawberries ought to have been condemned.

Appeal allowed.

May 19th, 1900.

TYLER v. KINGHAM AND SON (LIMITED).

This was an appeal by case stated from the decision of justices of Middlesex, sitting at Brentford, dismissing a summons, issued at the instance of the appellant, an inspector of weights and measures, against the respondents, charging them that, being persons dealing in margarine, they did not conform to one of the regulations referred to in Section 6 of the Margarine Act, 1887, inasmuch as they did deliver to Isaiah Longstreeth a package containing margarine without having durably marked on the top, bottom, and sides thereof, in printed capital letters not less than three-quarters of an inch square, the word "margarine." It was proved that on September 21st, 1899, the appellant purchased from Longstreeth, a retail grocer, an article which was represented to him as being what he asked for, namely, butter. The appellant purchased the article with the intention of submitting the same to analysis.

He complied in every respect with Section 14 of the Sale of Food and Drugs Act, 1875, and Longstreeth accepted one of the three parts into which the article purchased had been divided by the appellant. The appellant on the same day delivered one of the other parts of the article to the public analyst, who on October 3rd certified that the same contained 10 per cent. of foreign fat not butter-fat. After the analyst had given his certificate the appellant applied for and obtained summonses against Longstreeth, one under Section 6 of the Sale of Food and Drugs Act, 1875, and one under Section 6 of the Margarine Act, 1887. The article from which the sample purchased by the appellant was taken was purchased by Longstreeth, with no intention of having it analyzed, from the respondents, who delivered it to him with an invoice and in a tub marked "Pure Butter." The summonses against Longstreeth were heard by justices sitting at Brentford on October 24th. The justices found that the article purchased by the appellant was margarine, but that the words branded on the tub together with the invoice from the respondents amounted to a warranty given by the respondents to Longstreeth that the article was butter, and they accordingly dismissed the summonses. On October 26th the appellant applied for and obtained the present summons. On the hearing of the summons the appellant offered in evidence the certificate of the public analyst, but it was objected on the part of the respondents that the same was not admissible as evidence. They did not require the analyst to be called as a witness, but contended (1) that, the summons being in respect of a sale by the respondents to Longstreeth, the appellant was not a competent prosecutor, the right to proceed being limited by Section 20 of the Food and Drugs Act, 1875, to the person causing an analysis to be made, in support of which contention *Smart and Son v. Watts* (1894, 1 Q.B., 219) was referred to; and (2) that the certificate of the public analyst was not evidence as against the respondents, as no part of the sample of the article sold to the appellant and subsequently analyzed had been offered or delivered to them. The justices, being of opinion that the sample taken and certificate given in Longstreeth's case could not be used in the respondents' case, and there being no other evidence as to the nature of the article in question, dismissed the summons.

Lewis Richards, on behalf of the appellant, contended that, Longstreeth not having purchased the article in question with the intention of submitting the same to analysis, Section 14 of the Sale of Food and Drugs Act, 1875 (incorporated into the Margarine Act, 1887, by Section 12 thereof), did not apply, and that under the circumstances the certificate of the analyst was made evidence by Section 21 of the Sale of Food and Drugs Act, 1875. He cited *Buckler v. Wilson* (1896, 1 Q.B., 83). Section 21 of the Sale of Food and Drugs Act, 1875, so far as it is material, is as follows: "At the hearing of the information in such proceeding the production of the certificate of the analyst shall be sufficient evidence of the facts therein stated, unless the defendant shall require the analyst to be called as a witness. . . ." And Section 12 of the Margarine Act, 1887, provides that all proceedings under that Act shall be the same as those prescribed by Sections 12 to 28 of the Sale of Food and Drugs Act, 1875.

Bonsey, for the respondents, was not called upon to argue.

RIDLEY, J., said that the analyst's certificate obtained for the purpose of the previous prosecution was not admissible as evidence in the proceedings against the respondents. In *Buckler v. Wilson* there was evidence to show that the article in question was margarine. The pro-

duction of the certificate of an analyst was only one way of proving that the article was margarine. There were other ways of doing the same thing. But here the appellant had simply tried to put in as evidence of that fact a document which was not evidence.

BIGHAM, J., said that he was of the same opinion. The question was whether there was evidence before the justices that the article was margarine. The only evidence of that fact offered to them was a certificate of analysis procured for the purpose of prosecuting Longstreeth, who on some previous occasion was prosecuted for selling a part of the article in question as butter. By the Sale of Food and Drugs Act, 1875, such a certificate given under the circumstances provided for in the Act was admissible as *prima-facie* evidence of the facts stated therein in the prosecution of Longstreeth, but that did not make it evidence in the prosecution of anyone else in the world. When in the prosecution of the respondents the appellant tendered the certificate of analysis as evidence that the article sold by the respondent Longstreeth was margarine, the justices upheld the objection of the respondents to the admission of the evidence, and, in his Lordship's opinion, they were right in so rejecting the evidence. The respondents were entitled to require proper evidence of the fact that the article sold was margarine. The production of a document signed by a person who was not present, or who, at any rate, was not put in the witness-box, was not the proper way to prove the fact. The case of *Buckler v. Wilson*, cited by the appellant's counsel, did not apply at all. It was true that the prosecution was taken under the same section, but in that case the analysis had been taken for the purposes of the case, and the certificate was admitted without objection. It was true that an objection was taken that certain of the conditions laid down in the Act in regard to the analysis had not been complied with. But that objection having been held to be bad, the respondent in the case admitted the result of the analysis, and did not dispute that the article in question was margarine. Here, however, the respondents required proper and strict proof that the article was margarine.

Bonsey asked their Lordships to say whether they decided anything as to the question whether the appellant was the proper person to prosecute.

BIGHAM, J.: We have heard no arguments on that point, and we decide nothing upon it.

Appeal dismissed.

BEFORE RIDLEY AND PHILLIMORE, JJ.

May 19th, 1900.

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BATT v. MATTINSON.

This was an appeal by case stated from the decision of the justices of Wellingborough. An information was preferred by the respondent, Thomas Mattinson, an inspector under the Sale of Food and Drugs Act, 1875, against the appellant, Alfred Richard Batt, the manager of the Midland Stores, Wellingborough, charging him that on December 19th, 1899, he did unlawfully sell to the prejudice of the respondent, the purchaser, a certain article of food which was not of the nature, substance, and quality of the article demanded, namely, golden syrup, the same being adulterated with glucose syrup, contrary to Section 6 of the Sale of Food and Drugs Act, 1875. The summons was dated January 8th, 1900, and was served on January 9th, and was returnable

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on January 19th. No copy of the analyst's certificate was served with the summons, and the summons did not state the quantity or proportion of glucose alleged to be contained in the golden syrup. The analyst's certificate was not given until January 2nd. At the hearing before the justices it was objected on behalf of the appellant that, inasmuch as the information was not laid until January 8th, the proceedings should have been regulated in accordance with Section 19 of the Sale of Food and Drugs Act, 1899, which came into force on January 1st, and which provides that the summons shall state the particulars of the offence alleged, and also the name of the prosecutor, and shall not be returnable less than fourteen days from the day on which it was served, and that there must be served with the summons a copy of the analyst's certificate obtained on behalf of the respondent. Section 10 of the Sale of Food and Drugs Act Amendment Act, 1879, provided that the summons in proceedings under the Sale of Food and Drugs Act, 1875, should contain particulars of the offence charged, and be made returnable not less than seven days from the day on which it was served.

On the part of the respondent it was contended that, the offence having been committed on December 19th, the date of the purchase, the procedure followed, which was in accordance with the provisions of the Sale of Food and Drugs Act, 1875, and of Section 10 of the Act of 1879, was correct, the provisions of those Acts remaining in force, by virtue of Section 38 (2) of the Interpretation Act, 1889, as regards any offence committed before January 1st. The justices overruled the objection, and, having heard the case on the merits, convicted the appellant.

Bonsey, on behalf of the appellant, contended that, inasmuch as the provisions of Section 10 of the Sale of Food and Drugs Act Amendment Act, 1879, were repealed by the Sale of Food and Drugs Act, 1899, the provisions of the later Act applied to prosecutions instituted after the date of its commencement, notwithstanding the offence in respect of which the prosecution was instituted took place before that date, upon the principle that alterations of procedure were retrospective unless it was otherwise provided in the enactment making such alteration.

Macaskie, for the respondent, contended that the old form of procedure was the correct form, and relied on Section 38 (2) of the Interpretation Act, 1889, which provides as follows: "Where this Act or any Act passed after the commencement of this Act repeals any other enactment, then, unless the contrary intention appears, the repeal shall not—(c) affect any . . . obligation or liability . . . incurred under any enactment so repealed; or (d) affect any penalty, forfeiture, or punishment incurred in respect of any offence committed against any enactment so repealed; or (e) affect any investigation, legal proceeding, or remedy in respect of any such . . . obligation, liability, penalty, forfeiture, or punishment as aforesaid; and any such investigation, legal proceeding, or remedy may be instituted, continued, or enforced, and any such penalty, forfeiture or punishment may be imposed, as if the repealing Act had not been passed," contending that there was at the time of the commencement of the new Act a subsisting liability under the old Act, the legal proceeding in respect of which would not be affected by the new Act. He contended further that, even if the Act of 1899 applied, all matters in regard to which that Act was not complied with were matters which could be cured by an adjournment. He cited *Neal v. Devenish* (1894, 1 Q.B., 544), in which it was held, under Section 10 of the Sale of Food and Drugs Act Amendment Act, 1879,

that the omission of particulars of the offence from the summons did not deprive the justices of jurisdiction, but merely entitled the defendant to an adjournment in the event of the justices being satisfied that he was prejudiced by such omission.

RIDLEY, J., said that the general rule was that enactments altering procedure had a retrospective effect unless a contrary intention appeared from the enactment. There certainly was no such contrary intention expressed in Section 19 of the Sale of Food and Drugs Act, 1899. The respondent relied on Section 38 (2) of the Interpretation Act, and especially on headings c, d, and e thereof. But those provisions related only to cases in which the enactment creating the obligation, penalty, etc., had been repealed. The effect of the provision was that a person who had committed an offence prior to the commencement of the repealing Act remained liable notwithstanding the repeal of the enactment creating the offence, the old Act remaining in force to that extent. But in the present case the enactment creating the offence with which the appellant was charged was not repealed. For this reason the justices were wrong in holding that Section 38 (2) of the Interpretation Act had the operation contended for, and, accordingly, it was proper that the new procedure should be followed, notwithstanding the fact that the offence was committed prior to the commencement of the Act by which such new procedure was instituted. With reference to the point that all the matters in regard to which the Act of 1899 was not complied with were matters capable of being cured by an adjournment, he thought that the case of *Neal v. Devenish* was distinguishable, because the particulars were part of the summons and could therefore be amended under Jervis's Act. But, turning to the present case, the summons being made returnable less than fourteen days from the date of service was not a matter capable of amendment under Jervis's Act. It was a matter that never could be put right. Nor could the omission to serve a copy of the analyst's certificate with the summons be put right. If it was not done at the time of serving the summons it could not be done afterwards. For these reasons he thought that the appeal should be allowed.

PHILLIMORE, J., concurred.

Appeal allowed.

APPOINTMENTS.

- Benson, P. L., M.A., M.D.**, reappointed M.O.H. of Buckingham Rural Sanitary District.
- Crossfield, A. K., L.R.C.P.**, appointed M.O.H. of Dartmouth Rural Sanitary District.
- De Gruchy, C. W., L.R.C.P.**, reappointed M.O.H. of Caerleon Rural Sanitary District.
- Dunlop, T., M.B.**, appointed M.O.H. of Aldershot Urban Sanitary District.
- Edwardes-Ker, G. R., L.R.C.P.**, reappointed M.O.H. of Woodbridge.
- Gass, R. B., M.B.**, reappointed M.O.H. of Heysham Urban Sanitary District.
- Goodman, G., L.R.C.P.**, reappointed M.O.H. of Glanford Brigg Rural Sanitary District.
- Harnett, A., L.R.C.P.**, appointed M.O.H. of Eastleigh Urban Sanitary District.

- Harris, I. H.**, *M.R.C.S., D.P.H.*, appointed M.O.H. of Dartmouth Urban Sanitary District and Dartmouth and Totnes Port Sanitary District.
- Hollings, C. E.**, *L.R.C.P.*, appointed M.O.H. of Driffield Rural Sanitary District.
- Hughes, D. A.**, *M.R.C.S.*, reappointed M.O.H. of Barmouth Urban Sanitary District.
- Jackson, J. J.**, *L.R.C.P.*, reappointed M.O.H. of Wakefield Urban Sanitary District.
- Kirkby, W.**, *L.R.C.P.*, appointed M.O.H. of Maesteg Urban Sanitary District.
- Maidlow, W. H.**, *M.D.*, appointed M.O.H. of Ilminster Rural Sanitary District.
- Massey, D.**, *L.R.C.P.*, appointed M.O.H. of Berriew Rural Sanitary District.
- Newman, G.**, *M.D.*, appointed M.O.H. of Bedfordshire County, also M.O.H. (*pro tem.*) of Clerkenwell.
- Roberts, K.**, *L.R.C.P.*, appointed M.O.H. of Ampthill and Woburn Comb. Rural Sanitary District.
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JULY, 1900.

EDITORIALS.

CONDEMNATION OF UNSOUND FOOD:

FUNCTIONS OF MAGISTRATES.

THE decision of the Divisional Court of the Queen's Bench presided over by Mr. Justice Ridley and Mr. Justice Bigham, on Wednesday, May 16th last, on a special case stated by a Metropolitan Police Magistrate on the question of the condemnation of unsound food, is one of great importance. The point arose at the Thames Police Court, before Mr. Mead, when a sanitary inspector of the Board of Works for the Limehouse District, on the instructions of Dr. Thomas, Medical Officer of Health of Limehouse, applied for an order for the condemnation of certain strawberries as unsound food under Section 47 of the Public Health (London) Act, 1891, which is similar in terms to Section 116 of the Public Health Act, 1875. It appeared that the magistrate raised the question of whether the fruit alleged to be bad was exposed for sale, or intended for the food of man, seeing that the consignee had refused to accept it. The Court has held that it is for the medical officer of health to decide whether the fruit or food, as the case may be, was exposed for sale, etc., and that the functions of the magistrate, as soon as he had decided that the food was unsound, were purely ministerial, and that he had no alternative but to order the destruction of the fruit. Had it been otherwise, there would be no means of obtaining the destruction of food which is clearly unsound unless with the consent of the person in whose custody it was. The prior decision of *White v. Redfern* (5, Law Reports, Q.B.D. 15) is approved, and now becomes applicable to cases under the Public Health (London) Act, 1891.

CONDEMNATION OF TUBERCULOUS MEAT.

THE report by Dr. Sykes, Medical Officer of Health of St. Pancras, giving an account of the difficulties experienced by him in connection with the proper disposal of the carcass of a tuberculous animal, of which report we publish a summary in this issue,* emphasizes very forcibly the need of a more definite system in the condemnation of tuberculous meat, and suggests that the interests of public health are being very seriously subordinated to those of the meat trade. So important do we consider the issues involved in the case with reference to the whole subject, that we have submitted the summary in proof to certain medical officers of health who have a considerable practice in the supervision of the meat trade. Their replies will be found immediately following this article. We do not desire to criticise the course of action adopted by Dr. Sykes, except in so far as is inevitably inferential to our remarks. Our aim is more to outline certain considerations which we think should not be lost sight of when deciding whether to condemn or pass an animal, and certain others which we think materially affect the whole question of condemnation of tuberculous meat. We shall intentionally be dogmatic, but at the same time we shall be pleased to afford those who disagree with our views every opportunity to discuss them in future issues.

Is it safe to consider the flesh of a tuberculous animal fit for the food of man? We think not, except under very special conditions, which we shall specify later on. The bacillary nature of tuberculosis is beyond controversy, and, admitting that, it does seem to us to be illogical to say that one part of a tuberculous animal where macroscopic tubercular lesions can be found is unfit, and another part where no such *macroscopic* lesions are visible is fit. With our present knowledge it is impossible to demonstrate the absence of the bacillus and its products from any part of a tuberculous animal. Consequently the interests of public health require that the whole should be condemned. In saying this we are not unmindful of the conclusions of the Royal Commission on Tuberculosis, but the opinions arrived at by that Commission were the outcome of negative experiments, and a negative can prove nothing. Even if we grant that the risks of infection from the consumption of apparently sound portions of a tuberculous animal are small, we contend that it is not right that the public should unwittingly be exposed to those risks. It is true that heating the meat to a sufficient temperature will destroy the bacillus, but we think there is sufficient

* See p. 752.

evidence that the ordinary processes of domestic cookery do not ensure the elevation of the meat to the safe limits.* The Commission, recognising the chaotic condition of the prevailing practice of condemnation, differentiated two degrees of tuberculosis, one for total and the other for partial condemnation. That classification is admittedly, however, only tentative, and is not in accordance with the practice prevailing in countries where the supervision of the meat trade is on a sounder basis than it is in this. We would therefore urge that the entire carcass of an animal found to be tuberculous should be condemned. The question of allowing any part of such carcass to be used for food we will consider after dealing with the second part of our subject.

How are the interests of the meat trade to be safeguarded? The trade is at present, and we suppose will always be, opposed to the condemnation of the whole of every tuberculous carcass without distinction, but we think that objection would be removed were provision made for compensation. When a butcher buys an animal at a price which implies unfitness for food on the chance of getting it on to the market without detection, no question of compensation can be entertained; but under certain other circumstances it must be admitted that arguments can be adduced in support of such compensation. There ought, however, to be one condition precedent to any such claim. The butcher should have exercised proper precautions to assure himself that the animal was free from tuberculosis before purchasing it. Until recently the means requisite for such assurance were not available, but now the tuberculin test will afford *a priori* grounds for such assurance. Proper safeguards will be required to prevent the abuse of the test. "Fortifying" unhealthy beasts is, we believe, a practice already in vogue in certain parts of the country, and should be made a penal offence. It is not sufficiently recognised that the purchaser is entitled to get meat from healthy animals only. We contend that the flesh salvaged from a tuberculous animal is not "healthy" meat, and to sell such meat without declaration is, in our opinion, dishonest, and if there be no simple legal remedy for such illegal trading, there ought to be. It may be argued that to insist on the butcher who wishes to protect his interests demanding that all animals shall be free from tuberculosis is but to throw the burden of loss on the farmer. That we may admit, but the farmer can, if he choose, equally protect himself by buying his stock subject to a similar test, by keeping new stock apart for a period after purchase, and by properly housing and attending to

* See PUBLIC HEALTH, x. 235 (April, 1898).

the hygienic surroundings of his cattle. Assuming, then, that a butcher who has taken all the requisite steps to secure healthy animals should be compensated in the event of any proving to be tuberculous, how is such compensation to be provided? Two systems are available. The first and simplest is that of insurance, which the butchers (and farmers) can institute at once if they are so minded. Accounts of the systems in force in Germany have been published in this Journal,* and we need not now enter into any details. Having regard to the obligation on the part of the vendor to supply healthy meat, we are inclined to the view that this system is the more equitable. Under the alternative system compensation would be paid either by the rate- or tax-payer. The principal argument for such system is the fact that the carcass is destroyed for the good of the public; but that argument appears to us to be—in most cases, at all events—more than met by the obligation on the butcher already mentioned. Where, however, a butcher has done his best to secure healthy animals, and has met with misfortune, he might be compensated from the public purse. Compensation in that case should always be less than the market value of healthy animals; otherwise there will be a temptation to dispose of unsound stock at the public expense. For such a system it should be an essential that all slaughtering should take place in public abattoirs. Compensation could then be paid out of the dues and charges prescribed for the use of the abattoir and markets.

Against our claim for the total condemnation of tuberculous carcasses there will be urged the fact that much meat is imported which is under no supervision at the place of origin, and that the chances of detecting in this country the evidences of infection are almost infinitesimal. The remedy is to refuse to admit any meat which has not been inspected before and after slaughter and duly certified by a proper authority to be free from tuberculosis. At the same time, it must be remembered that the chief trade in dead meat is with countries where tuberculosis among animals is comparatively rare. Moreover, were such meat inspected as far as possible on arrival, and properly marked to distinguish it from the home-produced article, the latter would be able to maintain its pre-eminence in the retail market and command better prices.

Another argument which we anticipate will be put forward is that wholesale condemnation will remove from the markets a quantity of food which is at present consumed without apparent harm resulting. If this argument be allowed to be of sufficient weight to over-

* PUBLIC HEALTH, ix. 231 (April, 1897) and x. 159 (February, 1898).

rule our contention for universal condemnation, then we say that such infected and unhealthy meat should not be placed on the market except under one of two conditions—either it must be so marked or dressed as to plainly indicate its character and infected condition, and be sold with some explanation of the need of special precautions in the cooking, or else it must be dealt with by the condemning authority, as is done in Germany. Under either condition it will sell at lower prices, but that it will sell, at all events under the second, is evidenced by the success of the “Freibank” in Germany.* Of the two, we prefer the latter system.

We are inclined to the opinion that the total condemnation of tuberculous animals will do much to hasten the stamping out of tuberculosis among cattle. The closing of the markets (for that is what the system implies) against tuberculous animals will compel stock-raisers to take steps to produce and keep healthy animals only, and we question if the time necessary to lead to this result would be very long. Financial pressure has a potent influence in favour of reforms such as this.

There is one other matter to which we desire to refer very briefly. In the St. Pancras case the opinions taken in opposition to Dr. Sykes were those of veterinary surgeons. Without desiring to minimize the value of such opinions as to the pathological conditions actually prevailing, although we may draw attention to the apparent discrepancies in the descriptions of the morbid conditions present, we think that we may object to such experts being called in to settle whether the flesh of any particular carcass is likely to be injurious to the health of man or not. We submit that the training of a veterinary surgeon is not such as will enable him to express an opinion on that subject.

A SECOND ATTACK OF MEASLES A MONTH AFTER THE FIRST.—Gaucher (*Société Médicale des Hôpitaux*, in *Annales de Médecine et Chirurgie Infantiles*, December 15, 1899, p. 913) observed a boy, aged ten years, attacked with measles on June 2, 1899, from which he had completely recovered by the 15th of the month. His mother, who had had measles during childhood, contracted the disease from him, and showed the first signs of eruption on June 17. On July 5 the boy again became ill, showed the characteristic prodromes, and had a more copious eruption than during the first attack.—*Amer. Jour. Med. Sciences*.

* See PUBLIC HEALTH, x. 59 (November, 1897).

ST. PANCRAS MEAT CASE.

WE submitted advance proofs of the summarized report on this case to the Medical Officers of Health of London (City), Edinburgh, Liverpool, Birmingham, Glasgow, and Birkenhead.

CITY OF LONDON.—Dr. Sedgwick Saunders, with whom we had an interview subsequent to our letter, desired to correct a mistake with reference to the statement that part of the Meat Market was in Dr. Bond's jurisdiction as M.O.H. for Holborn. No part of the Central Meat Market owned and managed by the City Corporation is beyond the City limits for inspectorial purposes. Dr. Saunders stated most definitely that no carcass affected with tuberculosis would be "passed" at the Central Meat Market, and that the whole of any carcass so affected would be condemned as unfit for food of man. Under no circumstances does he recognise "localized" tuberculosis. In his opinion, the micro-organism having once gained access to the body, it is impossible to say that one part is free from infection and that another is infected.

LIVERPOOL.—Dr. Hope writes :

"The evidence you give me is not sufficient to enable me to form a judgment upon the case; nevertheless, since it may answer your purpose if I give you my views on the case as presented, my opinion is that the case is not one in which the carcass ought to have been condemned under the instructions issued by the Local Government Board. It appears to me also that the weight of evidence is against the seizure. As the case was on the border-line, Dr. Sykes, notwithstanding his own unquestionably great experience, would have been well advised to have called in further expert evidence; and from his account my impression is that the experts would have decided against him."

BIRMINGHAM.—Dr. Alfred Hill replies in the following terms :

"I have read the proof which you forwarded me, and, as far as I can judge without having actually examined the carcass in question, I should, in accordance with my long practice, have considered the disease sufficiently generalized to justify condemnation. It appears to me that if animals are only to be condemned when tuberculosis is found affecting the muscles, the question of condemnation of tuberculous animals might be as well disregarded altogether. I would remark that the principles laid down by the Royal Commission on Tuberculosis with regard to condemnation or non-

condemnation are only suggestive, and are neither final nor obligatory. Moreover, they do not cover, according to my view, the special case under consideration. The subject is an extremely difficult one, and therefore the sooner a distinct line of action has been laid down on the highest authority, the better for all parties concerned."

GLASGOW.—Dr. Chalmers has forwarded a note dealing with the subject generally :

"I think it is open to question whether much importance can be attached to an opinion expressed on a hypothetical case, for the written description of diseased conditions fails to convey to the mind the clear impression of their extent, which is so obviously requisite to the formation of an opinion on which judicial action might be based. But there are issues raised in the St. Pancras case which may fairly be discussed without reference to the practice of individual authorities, if only for the reason that opinion regarding the extent of tuberculosis in animals which warrants the condemnation of the carcass is admittedly in a condition of flux. The history recorded by Dr. Sykes very aptly illustrates the statement in the Report of the last Royal Commission, that both in regard to the amount and distribution of tuberculous disease which justifies condemnation and seizure of carcasses as unfit for food, the widest discrepancy both in opinion and practice prevails. It does more than this, however. When the Royal Commissioners outlined some principles which might tentatively be observed in the inspection of tuberculous carcasses, they brought out of a condition described by themselves as chaotic the elements of a standard of inspection. There is evidence in the wording of their recommendations that pathological conditions had more weight with them than pathological classifications, and we consequently find them recommending that a carcass, if otherwise healthy, shall not be condemned, although presenting combinations of certain local lesions, *provided these are collectively small in extent*. This is *dissemination* of the disease as distinct from its having become *generalized*, and the inference is, that both the extent of its distribution and the degree to which the various organs are involved are factors in determining any opinion as to the fitness of the carcass for food. In the St. Pancras case, however, the argument has been directed to considering whether certain lesions constitute a 'generalized' or only a 'localized' affection, the implied

suggestion being that the food value of a carcass is to be determined not by the extent or degree of the 'local' affection, but by the general condition of the carcass in which it occurs. This appears to be going beyond the Commissioners' recommendation. It is substituting for dissemination of the disease through various organs a term which implies a theory as to its method of distribution. It is subordinating the evidence of the actual presence of disease to a theory of its causation. This is a tendency to which I think you are well advised in directing the attention of your readers.

"One would like to know whether the 'abnormal patches' on the spleen were tuberculous, and, assuming they were so, how their presence is to be explained in the absence of any evidence of adjacent peritoneal affection?"

BIRKENHEAD.—Dr. Marsden sends a general note on the subject:

"I may say that it is with some hesitation that I venture to express an opinion at all. The fact of the matter is, that in the present state of the law it has become practically impossible to safeguard the public health with regard to tuberculous meat. The insufficiency of definiteness in the recommendations of the Royal Commission as to seizure of a carcass affected with tuberculosis gives so many opportunities for lawyers to twist the true and obvious meaning out of those recommendations, that I look upon it as hopeless, with our present powers, to seize any carcass except such as is obviously in the very advanced stages of the disease.

"Several causes have led to this result. First, the fact that so many of the veterinary surgeons of the old school who are asked to express opinions as experts have often a very imperfect knowledge of pathology; yet their views with regard to meat and cattle are generally considered by the ordinary magistrate as of far greater weight and value than those of what they are pleased to call a mere doctor, be he a professor or a medical officer of health of wide experience and many years' standing.

"Secondly, you have always a number of medical men who are willing to go into the witness-box and give evidence that the disease is localized or not advancing, or has become inactive, and therefore not dangerous, and thus confuse the issue in the mind of the magistrates. I have now had a very large experience in these cases, and it is the commonest thing in the Court to have evidence given to the effect that

the disease is 'localized' in the lymphatic system and glands, and therefore not injurious. It was also contended in one case, where almost the whole of the lymphatic glands were affected with tubercle from one end of the carcass to the other, that the disease was not in the muscular tissue, but was in fatty tissue, and therefore would not do harm. It was also contended that glands in the kidney fat and the subdorsal glands were not intermuscular, were not mentioned by the Royal Commission as thoracic glands, are not generally understood as such, and that therefore they could be cut away, and the carcass passed within the meaning of the Commission's recommendations. I have also heard medical men give evidence to the effect that the deep cervical or neck glands are to be considered as the pharyngeal glands of Paragraph c, Section 1, of the Commission's report.

"With regard to the St. Pancras case, I am of the opinion that Dr. Sykes was justified in considering that the carcass in question came within the recommendations of the Royal Commission as regards seizure, owing to the number of the organs affected and the extensive distribution of the disease in the thoracic and pharyngeal glands. But as a matter of practice, in this borough we should not have seized the carcass unless we had found tubercular deposits in the lymphatic glands or on the surface or other tissues of the meat itself. We should have taken all the internal organs and viscera, and let the body of beef go.

"I am further of the opinion that in the present state of the law such is the only course open to us, and that until experts are engaged to decide these cases we cannot hope for any remedy for the present state of affairs. I know of nothing in a more unsatisfactory condition than the present methods of meat seizure. Nothing requires greater expert evidence to understand the bearings of a case, and I would advocate, therefore, that the Crown should appoint certain well-known experts to act in such cases, and to advise the presiding magistrate regarding the technical difficulties which always arise."

The views held by Dr. Armstrong, Medical Officer of Health of Newcastle-upon-Tyne, are given in his paper "The Sale of the Flesh of Tuberculous Cattle for Human Food," which will be found in this issue. Dr. Armstrong had written his paper before we had sent out our letters of inquiry.

THE SALE OF THE FLESH OF TUBERCULOUS CATTLE FOR HUMAN FOOD.*

By HENRY E. ARMSTRONG, D.H.V.,
Medical Officer of Health of Newcastle-upon-Tyne.

Has a butcher the right to sell the flesh of a tuberculous animal for human food? The occurrence in London within the last week or two of a prominent case—in which a certain firm not only claimed, but were conceded, this right, after the detention of a carcass of beef by the officers of the sanitary authority—marks the acute stage at which the conflict between purveyors of meat and the official protectors of its consumers has arrived on this always important question. The statement of the case as published by the firm (the medical officer of health whose action is described has not yet, I believe, issued his reply) raises many points strikingly illustrative of the question at large, and therefore claiming the serious attention of all medical officers of health and meat inspectors, as it is probable that the example above indicated will be followed by other firms and butchers' associations throughout the country.

With regard to the position of the meat trade in the matter of tuberculosis, I wish to say at the outset that my sympathies are to a considerable extent with the butcher, from the fact that the cattle he buys as sound may, on slaughter, turn out to be diseased, and, through no fault of his, have to be destroyed, to his loss. The customs of the trade also, supported occasionally, perhaps, by official indecision or laxity, may have tended to encourage the idea that a little tubercle is of no great consequence. Not unnaturally, therefore, the owner of a carcass of meat affected with what he may have been told is a mild or localized ailment, objects to its entire destruction.

But, whilst fully appreciating the difficulties of the butcher's position as relates to tuberculous meat, it must not be forgotten that he can always safeguard himself by purchasing subject to the meat being "passed" after slaughter. By doing so he would compel stock-breeders to take steps for stamping out the disease from their herds. This matter has not yet received the attention its importance merits. It is also open to him to protect himself, as many butchers do, by insurance.

Let us now turn to the proper subject of this paper. Purveyors

* Read before the Northern Branch of the Incorporated Society of Medical Officers of Health, May, 1900.

of meat appear to think, and, indeed, freely affirm, that the medical officer of health or inspector who causes the seizure of an entire carcass of beef on account of tubercle in only one part or organ is acting wrongly. This idea is based on failure, on the part of the trade, to distinguish between the disease and its manifestations. In the case in question, as in general, the butchers and their well-known veterinary advisers confound tubercle with tuberculosis. The danger from the flesh of a tuberculous ox lies not only in the fixed tubercles, but in the free bacilli which gave rise to them, and of whose invisible presence they are the tangible proof. These organisms, circulating in the fluids of the body—and not the tubercles only—constitute the disease, which, like other zymotic diseases, has its period of incubation before the occurrence of the characteristic lesions rendering it recognisable to the naked eye. The universality of these organisms or their products in the diseased animal is proved by the tuberculin test, or by the feeding of other animals with the juice from the apparently unaffected flesh, or by inoculating them with the juice expressed from it.*

The appearance of tubercle in the tissues and organs affords no evidence of the departure of the bacilli from the fluids of the body, any more than the eruption of small-pox or typhus fever on the skin is evidence of the disappearance of infection from the interior. Tuberculosis, the disease, is always general; tubercle, the symptom, on the other hand, is always localized. To affirm, as do the veterinary experts in the case in question, that tuberculosis is "localized" when lungs, bronchial glands, liver, and mesenteric lymphatic glands are what one of these gentlemen terms "slightly affected" is absurd.

When, as in the above instance, several parts are charged with tubercle, the absence of that pathological product from the rest of the carcass cannot be positively affirmed without minute dissection of the flesh; neither can any statement as to the absence of tuberculosis from the muscles, etc., be justifiable without an exhaustive bacterial examination or inoculation tests with the fluids. Yet, apparently without any such inquiry, the veterinary professors in this case, whilst admitting the presence of tuberculosis in some of the viscera, did not hesitate to assert that the disease was "absolutely localized" (or, in other words, confined to these organs), and that the rest of the carcass was "in prime condition."

Visible tubercles are never so universally distributed throughout the body that no particle of it is free from them; hence it goes

* Experiments of Dr. Sidney Martin (Royal Commission on Tuberculosis, 1895) and several other authorities.

without saying they are always localized to the parts where they occur. But if we are to be guided in practice by the doctrine of localization, we shall never condemn more than these parts, no matter how numerous the tubercles; and in course of time may be told we are going too far in doing this, seeing that thorough cooking of the flesh kills the bacilli!

Whatever the views of veterinarians or butchers, we may be sure the public will not regard the meat of a tuberculous animal as healthy, any more than they will regard any part of a consumptive person as free from disease; nor will the consumer willingly pay for such as sound meat. The sale of it without declaration as to its real nature is a fraud.

The responsibility of medical officers of health and meat inspectors is greatly increased by the effect of the heavy consequential expense in which they may by their action involve their sanitary authorities. The Report of the Royal Commission on Tuberculosis is by no means a universal guide as to the conditions under which a carcass should or should not be condemned. The rules there laid down, although calculated to stimulate a lax officer, are of but little help to others, as they are neither pathologically satisfactory, legally authoritative, or even generally applicable to the great majority of everyday cases.

The medical officer of health may, in passing, be reminded that it is his duty to satisfy his authority, and not necessarily the meat trade, by his action. In this respect he holds a different position to the veterinary surgeon, whose duty is to satisfy his client. The medical officer of health will often do well to reserve for his authority all explanation or justification of his procedure. In dealing with tuberculous meat, as he may at any time, and on very short notice, be called on to do—whether he rejects the nauseous doctrine of localization or otherwise, he should, as far as possible, make up his mind beforehand as to where he will draw the line between “pass” and “seizure,” and, having done so, proceed to act with decision and firmness. He should be fully prepared for the possible consequences of his action, which, whatever it may be, he must bear in mind concerns the public, the sanitary authority, and the trade. He should hesitate before being led by the customs of the butchers, which, in so far as they are dictated by commercial instincts, tend to make his duty harder to do.

In practice the medical officer of health is brought much into communication with the members of the veterinary profession, with whom it is to the general interest that he should work on cordial terms. Such a relationship is as necessary in its own way as that

which, in matters affecting human diseases, exists between his medical brethren and himself. The opinion of the veterinary surgeon as regards the diseases of animals—which is, of course, paramount—is often of the greatest value to the medical officer of health. But there the function of the veterinary surgeon in public health work ends. It is for the medical officer of health to say what is and what is not fit for human food. That has been my practice during a long official life, in which my association with the members of the sister profession in the North of England has been invariably harmonious and helpful. This satisfactory experience is, I think, largely due to the fact that both they and I have kept our proper positions in relation to each other.

In conclusion, the following practical suggestions are offered, in the hope of their being acceptable to younger medical officers of health.

When called on to deal with butcher's meat, make your examination quite complete before forming your opinion. Avail yourself of all the information you can get from veterinary surgeons, butchers, or inspectors. Weigh carefully the consequences, to both sides, of your decision. Make your judgment carefully and deliberately, express it clearly and decidedly, and adhere to it firmly. When in doubt as to seizure or otherwise, consult, if possible, a medical officer of health of greater experience than yourself, bearing in mind that your consultant may also have to be your witness. In view of opposition in Court, it is well to know several witnesses of weight, on whose opinion and testimony in support of your action you can rely.

Condemnation of a carcass does not necessarily imply seizure and carrying of it before a magistrate. Seeing the unsettled state of the question of the sale of tuberculous meat, destruction of it by the owner's consent will often, under existing circumstances, be sufficient. In such cases care should always be taken to obtain that consent in writing.

EMPTYING CESSPOOLS.—We have received the following: “The Harpenden authorities have recently acquired an improved vacuum cesspool-exhauster capable of emptying cesspools in a very economical and cleanly manner. The sewage being drawn quickly up into a large air-tight tank without exposure, no offensive smells—so abominably characteristic of the old method—are caused. In consequence of this the plant can be operated during the daytime without rendering its presence in any way objectionable to persons in the locality. The apparatus is of Merryweathers' make.” The principle appears to be that of Lienuhr.

THE SANITARY CONDITION OF WARRINGTON A HUNDRED YEARS AGO.*

AS SHOWN IN TWO EARLY REPORTS THEREON.

By J. GUEST GORNALL, M.A., M.B., D.P.H., Cantab.,
Assistant Medical Officer of Health of Warrington.

A SOCIETY like this has for one of its chief objects the discussion of the present aspects of public health work, and for one of its chief interests the fostering of all those developments of hygiene which are, we hope, preparing the way for the ideal condition of the future. But I do not think it will be altogether inconsistent with our aims, or entirely without profit, for us to turn our thoughts for a few moments to the past, out of which we have developed, and from which our condition at any moment is only a stage in the march of progress towards the future. It is for this reason that I wish to turn your attention from subjects such as generally come before you to the contents of the Bills of Mortality of the Parish of Warrington for the years 1773 and 1791, and to certain observations thereon by local men, who, though not writing officially, yet have in this way provided us with annual reports of a primitive type. It is from these that I am able to give anything like an idea of the sanitary condition of the town of Warrington at the period in question; and, seeing that what these men had to say is far better given in their own words than mine, I shall be able to claim but little credit for my paper, which must necessarily be largely made up of quotations. I trust that, all the same, the subject may not be without interest, illustrating, as it does, the condition of things in what may be called a period of transition, when the humanitarian movements by which the eighteenth century was so characterized, the outcome both of advancing scientific knowledge as well as of increased philanthropic zeal, had not as yet shown much promise of the fruit they were ultimately to begin to produce, and to go on producing in ever-increasing quantity in the nineteenth century, in the form of legislative enactment for bettering the sanitary condition of the people.

Sir John Simon, in his interesting book on English Sanitary Institutions, lays especial emphasis on two very dissimilar movements as giving an impetus to aspirations in the minds of men which ultimately culminated in setting up the splendid system of

* Paper read before the North-Western Branch of the Incorporated Society of Medical Officers of Health, April, 1900.

public health service with which we are now so familiar, that we are very liable to forget how recently, and by what very slow and difficult stages, it has developed. These two movements were, firstly, the religious revival, of an evangelical type, associated with the name of Wesley, the outcome of which was certainly a great increase in the amount of money and help given to all kinds of beneficent institutions, such as hospitals and other charities, in which many people helped who had scant sympathy with the peculiar religious opinions of the Methodists; and, secondly, the French Revolution, which, by the discussions it led to in this country, greatly aided the growth of the cry for popular self-government. The consideration of these movements need not detain us now; and I only mention them because the two dates of the papers which I have transcribed are coincident, the first with the full tide of Wesley's work (1773), and the second with the third year of the French Revolution (1791).

The period then to some extent explains the interest which was evidently being shown in subjects related to the well-being of mankind, and I have no doubt that the archives of many other towns could furnish similar instances of attempts to form some conclusions as to the causes of disease and mortality from the facts which parish registers and local inquiries furnished. It must be remembered, however, that there was going on during that time a great increase in the inquiry into the secrets of Nature by experimental methods, and that the century saw the beginning of the foundation of public health upon a scientific basis. The researches of Mead as to the causes and prevention of gaol fever (and its synonyms ship fever, putrid fever), otherwise typhus, of Sir John Pringle as to the diseases of the army, and of Dr. Lind as to the cause of scurvy, which killed more British seamen than all the storms and battles through which they passed, the identification by Baker of Devonshire colic with lead-poisoning, the first principles of sound methods of ventilation laid down by Hales, and other discoveries which did much to ameliorate the condition of mankind (greatest of all being, of course, the making known of vaccination by Jenner in 1798), were the first steps taken in the development of preventive medicine as now understood. But the spirit of inquiry was not peculiarly characteristic of the more noted men of the period. All over the country the advance of knowledge was stimulating men to an interest in the problems presented by their own local experience.

At this period Warrington was a small country town on the main coach-road to the north, chiefly a centre for the sale of agricultural produce from the surrounding country districts, but possessing

several small manufactures of various kinds. Though the time was doubtless past when a letter was addressed to "Liverpool, near Warrington," the latter was still of some importance. It was built on a very small area, with narrow streets and alleys, with open drains and cesspools, and deriving its water-supply from wells probably highly polluted.

During the eighteenth century there existed in Warrington an institution known as the Warrington Academy, which was founded by the instrumentality of the old Presbyterian denomination, a body now called Unitarians, for the education of its ministers, and others whom the Test Acts then excluded from the national universities. This institution was in some sense the forerunner of the great educational institutions which are now attaining such great importance in our midst, *e.g.*, Owens College and University College, Liverpool. The Warrington Academy, of course, was on a very small scale, and had a somewhat inglorious and chequered career before its final dissolution. Nevertheless, it was fortunate in having among its teachers several men of considerable ability, most famous among whom was Priestley, the discoverer of oxygen, who taught there for some years. Certainly one thing to the credit of this institution was its scientific spirit, and the zeal which its members displayed in research of various kinds. Among them was a minister, the Rev. John Aikin, whose remarks on the Bill of Mortality of the town of Warrington for the year 1773 I am about to reproduce. The copy was originally obtained from the Philosophical Transactions for 1774, the proceedings of the Royal Society, to which body they were communicated by Dr. Percival, a well-known physician in Manchester. At that period, of course, the parish clerk was the sole registrar, and the only available source of vital statistics:

"The town of Warrington, by the best account yet procured, contains between 1,600 and 1,700 houses. At five persons to a house, which is supposed a sufficient allowance, as but few are occupied by more than one family, this will give above 8,000 for the number of inhabitants.

"The average of yearly marriages, christenings, and burials, registered in the parish church from 1750 to 1759 is: Marriages, 73; christenings, 237; burials, 199. That for the years 1770, 1771, 1772 is: Marriages, 95; christenings, 331; burials, 258.

"This will serve to show the increase of the place, and its comparative healthiness; especially if we consider that the deaths are much more exactly registered than the births. In the present bill the number of children who died after receiving only private baptism, in consequence of which their deaths were registered but not their births, amounts to seventeen; which might therefore be added to the average of christenings for the

three last years, and will form an extraordinary instance of healthiness and increase. The present Bill also takes in the registers kept by different societies, in which the births much exceed the burials, as many of the latter are entered at the parish church.

"The melancholy overbalance of burials which now occurs plainly arises from the ravages of a single disease, the small-pox, which, perhaps, has seldom raged with greater malignity than in its late visitation of the town. Its victims were chiefly young children, whom it attacked with such instant fury that the best directed means for relief were of little avail. The state of the air went through all possible variations in the course of it, but with no perceptible difference in the state of the disease. In general the sick were kept sufficiently cool, and were properly supplied with diluting and acidulous drinks; yet where they recovered, it seemed rather owing to a less degree of malignity in the disease, or greater strength to struggle with it, than any peculiar management. Where it ended fatally, it was usually before the pustules came to maturation, and indeed in many they showed no disposition to advance after the complete eruption, but remained quite flat and pale. The gradual progress and decline of the disease will appear from the table of months. Its proportional virulence began to abate considerably before it ceased. I cannot with certainty lay down the general proportion of deaths; but in one neighbourhood I found that out of twenty-nine who had the disease twelve died, or about two in five; in others the mortality was still greater, and I have reason to believe it was not less on the whole. It may be, perhaps, worthy of observation that the proportion of females who died to males was nearly as three to two. While we lament the severity of the scourge with which we have been afflicted, we cannot but highly regret that a practice which experience has established as so effectual a security against it was so little followed. Not ten, I believe, were inoculated in the whole town and neighbourhood; these all did well, yet their example was not sufficient to overcome some accidental prejudices taken against it. Indeed, the poor, who were the chief sufferers in this calamity, besides these prejudices, might be deterred by the idea of expense attending this branch of medical assistance. but if the opulent and charitable would reflect how exceedingly useful their benefactions directed to this point would be, that by a proper encouragement of this practice the lives of 200 of the rising generation might, in all human probability, have been saved to the public in the course of one year, the regret of having lost such an opportunity of doing good would, I hope, be succeeded by suitable resolutions for some future occasion. It would be easy to suggest a plan for promoting the practice of inoculation at a very moderate expense, and I am persuaded the task of engaging the assistance of the faculty would be the least difficult.

"With respect to the general table of diseases, the obvious uncertainty and inaccuracy of an inquiry which in most cases could only be made by the clerk in the churchyard made me despair of rendering it in any degree subservient to the purposes of science. It has not, therefore, been attempted to give it a

scientific form; but the articles have for the most part been inserted just as they were given in. Indeed, the alarming article of consumption, which includes all those returned under the common terms of weakness, surfeit, and decay, has been arranged under three different periods of age, to enable the medical reader the better to judge of the different diseases contained under it.

"The Table of Ages and Conditions has been drawn up with great exactness, and will certainly, in a proper series, form useful grounds for calculations in political arithmetic.

"In this light it is hoped that the utility of accurate Bills of Mortality will be generally apparent, and that since the benefit of them is not confined to one profession all will concur in encouraging them."

There is very little in the above remarks that calls for comment, but they appear to have been made by a man of a scientific habit of mind, who clearly appreciated the hindrance to any advance in medical knowledge caused by the absence of any certification of the causes of death by qualified people. And this was more than sixty years before the passing of the Registration Act (1836), which first made it possible to obtain national statistics of life and death.

The significance of the figures bearing on small-pox becomes all the more apparent when one learns (as may be done from Dr. Percival's essays) that all the deaths from small-pox were of children under ten years of age. One can well understand how Jenner's great discovery, the first paper on which was published in 1798, in the end elevated him into recognition as one of the greatest benefactors of his country, and indeed of the human race.

I now turn to the Bills of Mortality for the year 1791, which, though telling of a year in which the public health was distinctly better than in 1773, show that the same causes of ill-health and premature death still persisted. The following observations by Dr. Moss, who was a local practitioner of good standing, appended to the published statistics, bear this out as well as giving some information about other places in the country.

"Bills of Mortality," he says, "demonstrate that very few of the human species die of old age or natural decay; the greatest part by far are prematurely cut off by disease. Of all the animal tribe who bring forth only one at a birth, none die in such numbers as the human species. Infant deaths everywhere swell the gloomy list of mortality, especially in cities and large towns, which are in a peculiar degree fatal to them. In London and all the great capitals of Europe, upon an average one half of the children born die under two years of age. In country towns and villages the proportion of infant mortality greatly decreases. In Manchester half of the children born die under five years of age. In Warrington about four in eleven die under that age; but were the ravages of the small-pox prevented by any means,

the number of deaths under that period would not fully amount to one in four; and hence may be demonstrated the benefit arising from a general inoculation. In country districts infant mortality is very small, the major part living to twenty-seven, thirty-three, and forty years of age. And in some very healthy, open districts and country parishes half the inhabitants born live to forty-six and fifty. What a striking disparity between the duration of town and country life! Our surprise will, however, in a great measure give place to concern if we consider that in the early stages of infant existence life in them is extremely frail. Infants in cities may not inaptly be compared to tender plants excluded from fresh air (the very principle of life), or to fish confined in stagnant or muddy waters—they fall victims before they have acquired seasoning and solidity enough to make them endure the pernicious influence of confinement and the noxious effects of the adulterated surrounding element. From these circumstances, and the havoc produced by intemperance and irregularity, we shall not find it difficult to conceive why the burials in large cities and large towns should so greatly exceed the births, and why in country parishes and open districts of the country, by an opposite mode of life, the exact contrary should so uniformly happen. On this account it is that a recruit is furnished for the consumption of cities, war, epidemics, etc., the country redundancy preventing depopulation. In the parish of Warrington during the last five years the births have amounted to 2,150, or 430 annually; the deaths in the same period to 1,577, or 315 annually; the births giving a surplus of 115 at a medium. And if we reckon 10,000 inhabitants to the town of Warrington, the average of yearly deaths to the whole number is as 1 to 31. In Manchester it is 1 in 28; in Liverpool, 1 in 27; in London, 1 in 20; and in Edinburgh, although not more than 50,000 inhabitants, yet the deaths through the different stages of life agree nearly with London. The cause is obvious.

"In comparing the lists of male and female births for the last five years, we find that the former has exceeded the latter by 64, and that the male deaths in the same period have exceeded the females by 47; so that the excess in favour of the male is reduced down to 17. In infancy, and throughout childhood especially, the deaths of males are said to preponderate over the other sex. Providence has so ordained it through the various nations—at least, of Europe—that more males than females should be born, the casualties to which they are more exposed, and other difficulties which they have to surmount, rendering such a surplus necessary.

"It has been observed that in all the sickly seasons of country parishes the burials exceed the christenings, and, according to the nature of the epidemic and morbid state of the season, the mortality varies in degree. This observation does not seem to hold good with respect to Warrington, for during the epidemic seasons of several years the births have constantly exceeded the burials. During the whole year of 1790, when two principal epidemics prevailed, viz., the small-pox and putrid fever (which swept away a considerable number of the inhabitants), the total of burials was less than the births by eleven, notwithstanding the births had that year decreased fourteen.

"To what cause shall we ascribe the numerous deaths from convulsions? The subjects, I apprehend, were principally infants under two years of age. May not pains, acidities, and disorders of the stomach and intestines, which at this period are extremely irritable and delicate, be a frequent cause of fatal convulsions? In cutting teeth, too, children may die convulsed.

"Consumption every year considerably raises the list of mortal diseases; several of the deaths under the age of fourteen may not improperly be imputed to the dregs of the natural small-pox, measles, whooping-cough, and various other febrile and chronic distempers.

"From what has been observed, it must afford much satisfaction to the inhabitants of Warrington to find that, amidst the various and almost innumerable ills to which this frame of ours is liable, the losses of the period from which we have deduced our observations have been highly compensated by the increased number of births.—DANIEL MOSS."

Here, then, we have a health report for a year which was regarded as one of comparative healthiness, while the previous one dealt with a period of especial unwholesomeness. It hardly needs a comparison with the statistics of 1899 to show how far we have advanced beyond the sanitary state existing in both these years, and the list of causes of mortality shows us at once that among them were diseases which are nowadays well-nigh extinct, typhus and small-pox. It cannot, however, be said that the diminution in infant mortality has been anything like so striking as one might have expected; and whether it be that, despite the removal of two of the most dangerous zymotics, factors of mortality then prevalent have acquired greater virulence, or that new causes of death have come into play, or, lastly, that the unfit who were then weeded out by one disease are now weeded out by another, we cannot avoid seeing that the problem of infant mortality is none the less awaiting solution.

It would perhaps be idle to speculate as to the meaning of the curious diseases given as causes of deaths, for the names of which in possibly only a few instances were medical men responsible. With our modern knowledge we should be inclined to put down a majority to ill-defined and not specified causes; it is remarkable what a large number are actually so entered, *e.g.*, "suddenly."

Statistical Summary of Mortality Bills of Warrington for the Years 1773 and 1791.

	1773.	1791.	Compare 1899.
Estimated population ...	8,000	10,000	
Marriages ...	93	127	64,000
Births ...	386	444	534
Birth-rate ...	48.2	44.4	2,309
Deaths ...	473	286	36.07
Death-rate ...	59.1	28.6	1,313
Infantile mortality ...	256.4	182.4	20.09
			194

Causes of Death.

	1773.	1791.		1773.	1791.
Aged ...	32	39	Inflammation of		
Asthma ...	3	9	bowels ...	2	2
Cancer ...	—	1	Influenza ...	—	2
Casualties :			Jaundice ...	—	2
Drowned ...		2	Measles ...	1	2
Accident ...		1	Mortification ...	1	2
Burned ...	5	6	Palsy ...	7	4
Murdered ...		1	Purples ...	—	1
Childbed ...	5	2	Quinsy ...	1	—
Chincough ...	16	—	Rheumatism ...	—	1
Consumption :			Scrofulous swell-		
Under 14 ...	24	31	ing ...	1	—
14 to 45 ...	36	38	Small-pox ...	211	10
Above 45 ...	36	20	Soon after birth ...	6	7
Convulsions ...	34	48	Suddenly ...	6	7
Dropsy ...	13	11	Surfeit ...	—	7
Fever ...	15	14	Teething ...	7	7
Fever and sore			Worm fever ...	10	—
throat ...	—	6	Unknown ...	1	—
Gravel ...	—	2			
Gripes ...	—	1	Total ...	473	286

SEWAGE DISPOSAL.—Colonel Durnford, R.E., an inspector of the Local Government Board, held an inquiry at the Town Hall, Wantage, on May 3rd, into an application for power to raise a loan of £4,000 for the purpose of sewage disposal works. The method of purification proposed is that of the septic tank system.

According to the *Ceylon Standard* of April 9th, Mr. James Mansergh, C.E., has recommended the septic tank system of sewage treatment for Colombo, and will thus save the great cost of the up-keep necessary in the original scheme proposed.

CHEMICAL ADULTERATION OF MILK.—According to a statement in the *Revue Scientifique*, the chemical adulteration of milk is one of the hygienic factors now to be dealt with. It seems that M. Denigès, of Bordeaux, having obtained possession of three samples of yellow powder used by certain milkmen of Bordeaux to preserve their milk, made a chemical analysis of it. This analysis showed that two of the powders were composed wholly of neutral chromate of potash, that the third was a mixture of one part bichromate of potash and two parts neutral chromate, and that the suspected milk had been adulterated with the last substance in the proportion of 0.30 gramme to the litre, say 5 grains to the quart. The alkaline chromates are, in fact, powerful antiseptics, capable, even in small quantities, of retarding lactic fermentation very noticeably, if not of stopping it entirely. But because of the deleterious action of these salts on the organism the *Revue* calls emphatically for their complete exclusion from food substances, and particularly from milk, of which so many young children drink relatively large quantities.—*Food and Sanitation.*

ON THE DURATION OF INFECTIVITY OF SCARLET FEVER AND CAUSES OF "RETURN CASES."

By A. E. PEARSON, M.R.C.S., L.R.C.P.,
Medical Superintendent of the City Infectious Hospital, Leeds.

THE author stated that the object of his paper was rather to stimulate discussion than to bring forward any novelty. He desired to urge the need of more frequent bacteriological examination not only of cases of supposed diphtheria, but also of all classes of throat affections. Could the micro-organism of scarlet fever be determined with certainty, it would be possible not only to avoid errors of diagnosis, but also to determine definitely the length of infectivity, and thus avoid the occurrence of "return cases."

He dealt with the subject under three heads: (1) The micro-organism of scarlet fever; (2) "return cases"; and (3) the duration of infectivity of the disease.

1. *Micro-organism of Scarlet Fever.*—Klein's reports on this micro-organism, which he named *Streptococcus longus* or *scarlatinae*, were presented to the Local Government Board in 1886, 1896, and 1897. Klein succeeded in isolating the streptococcus from the blood and throats of patients in the acute stages of scarlet fever, and from the udders of cows whose milk gave rise to an outbreak of the disease. In 1890 Kurth described an apparently identical organism under the name of *Streptococcus conglomeratus*, which he isolated from the throats of patients ill with scarlet fever. In his second report Klein stated that he had been unable to isolate the streptococcus from the desquamated cuticle or from the urine. The former statement supported the view held by many that the desquamated cuticle was not the important factor in the dissemination of the disease, as is commonly supposed. Klein also reported that he had isolated the organism from nearly every scarlatinal throat which he had examined, and that it was absent from all other throats, normal or pathological, examined by him. In his last report he stated that he had found the streptococcus in the throats and in the discharges from noses and ears of patients in the first up to the tenth week of attack, and even as late as the seventh month. The importance of this last observation would be appreciated in connection with "return cases."

Dr. Pearson then proceeded: The streptococcus described by Klein differs from the *Streptococcus pyogenes* and the other short

* Abstract of a paper read before the Leeds and West Riding Medical-Chirurgical Society, April, 1900.

streptococci in producing a peculiar nebulous whitish-gray mass of cocci in broth culture, which mass, as it grows, gradually settles to the bottom of the tube, leaving the remainder of the medium quite clear. Examined with the microscope, the growth is seen to be made up of long, almost endless chains of cocci. It is an acid producer, and when grown on agar at 37° C. grows as very small white opaque colonies in twenty-four to forty-eight hours.

Dr. Klein states that when the organism is injected subcutaneously into mice, it gives rise to fatal septicæmia with local oedema and redness.

I have made a few observations on my own account on cases admitted to the Leeds Fever Hospital, pursuing, however, a somewhat rougher but readier plan. I contented myself by removing, with a platinum loop, a small portion of secretion from the throat, nose, or ears, sowing at once in a 10 per cent. glycerine agar culture tube, cultivating at 37° C. for twelve to twenty-four hours, and examining and staining in the usual manner. Dr. Klein used a cotton-wool swab, and washed the swab in sterile salt solution, afterwards transferring to nutrient agar. It is possible that the following results of mine may be vitiated on that account. Nevertheless, I was able often to demonstrate the presence of the *Streptococcus conglomeratus*.

Of 100 consecutive cases of scarlet fever examined at dates varying from the first to the fourteenth day of the disease, I found:

In 38 cases,	<i>Streptococcus conglomeratus</i> or <i>longus</i> .
In 18 "	<i>Streptococcus brevis</i> .
In 18 "	<i>Staphylococcus albus</i> .
In 25 "	<i>Staphylococcus aureus</i> .
In 4 "	diplococci.
In 3 "	diphtheria bacilli.
In 8 "	indefinite results.

I found that the *Staphylococcus albus* was the most frequent associate of the long *Streptococcus conglomeratus* and the *aureus* most often in the later cases. In two out of six cases examined, I was able to cultivate the *Streptococcus conglomeratus* after the sixth week.

I think what I have stated makes out a strong case for regarding this *Streptococcus longus* or *conglomeratus* as the probable cause of scarlet fever. I would add that if systematic bacteriological examination in cases of scarlet fever does nothing else, it will demonstrate the absence of diphtheria bacilli, and thus exclude cases of mixed infection.

2. "Return Cases."—This term is applied to cases which arise,

or are supposed to arise, in consequence of the return home from hospital of a recently discharged patient.

A scarlet fever patient who has presumably gone through a sufficient term of isolation, and has obtained what patients term a "pass," is discharged. An interval of varying length takes place, after which another case arises in the same house. The first case, adopting Dr. Killick Millard's terms, is "the infecting case"; the period elapsing before the onset of symptoms in the second case corresponding to the incubation period is "the interval," and the second, or infected case, is the "return case."

A correct definition should contain a limit of time of the "interval" or incubation period. Some of these so-called "return cases" arise after an interval of ten or fourteen days, or even of a much longer period, some, on the other hand, within an interval of a week.

In hospital one has opportunities not shared by the outside world of observing the incubation period. From a considerable number of observed cases I am quite confident that it is a rarity for this period to exceed a week, and most often it is three or four days. Occasionally there may be a much longer interval in adults between exposure to infection and onset of disease. This is frequent in hospital staffs. The fact is, persons insusceptible from their age (say over fifteen) have a not inconsiderable power of withstanding attack from phagocytosis or other inherent antagonistic influences, till at some time the body tissues become weakened from ill-health, rendering pathogenic attack liable.

Similar long intervals do undoubtedly occur outside hospital. There are concomitant causes, at present not explainable, acting in houses or localities where the scarlet fever organism has once found a footing. Two recent cases suggest the influence of some such causes. I admitted a case from a certain house on January 4th, and another case occurred in the same house on February 14th, the first case being still in hospital. In another case I was about to discharge a patient after a stay of eight weeks, but for some reason did not do so. The next day a second case came from the same house.

The number of these "return cases" which occur in connection with hospitals is not great, or of such number to cause uneasiness. In our hospital in Leeds they are about 1.5 per cent. per annum, taking all cases irrespective of the length of "interval."

In 1896	they were	2.5 per cent.
In 1897	"	1.8 per cent.
In 1898	"	0.9 per cent.
In 1899	"	1.0 per cent.

In discussing the origin of "return cases" the following factors have to be taken into consideration:

1. Length of isolation or of possible infectiousness of patient.
2. Possible causes lying in the patient.
3. Seasonal influences.
4. Causes possibly attached to incomplete or ineffective disinfection.

3. *Length of Isolation Period or Period of Infectivity.*—No hard and fast rule can be laid down as to the length of this period. It is somewhat unfortunate that a six weeks' isolation has been accepted as a settled standard not only in the minds of the laity, but of the profession. It is very difficult to persuade the friends or patients that it is often an insufficient period. Klein, as already mentioned, found what he considers to be the specific organism of the disease after a much longer interval. I fix no time for my patients, and endeavour to keep them until all pathological signs have disappeared from nose, throat, and ears. Moreover, I have latterly examined many cases by cultivation from some or all of these parts to determine if there were any active growth of streptococci. A good deal, I think, could be done in this direction, but it of course demands much time.

In some 80 per cent. of the "return cases" otorrhœa or rhinorrhœa appears to be the channel of infection. It is certain that the organism may persist in these discharges as late as the second or even third month of the illness. Thereafter the discharge seems to be kept up by non-scarlatinal pyogenic organisms.

Often an otorrhœa or rhinorrhœa will develop after discharge from hospital, the bathing-out process being possibly responsible in some cases. In other cases the streptococcus may, after remaining inactive for a varying period in the nasal and aural passages, when no discharge is to be observed, become virulently infectious at a later date. Atmospheric conditions also, I think, operate in some cases. These catarrhal states are more frequent in cold, humid months. Sixty per cent. of our "return cases" occurred in the months of December and January, and 75 per cent. between October and March. These apply to the last five or six years.

From my own experience I would prescribe an isolation period, if a fixed period should be defined at all, of not less than eight weeks in winter and seven in the summer months, subject, of course, to all abnormal discharges or albuminuria being absent at the end of that time. Continued desquamation, in my opinion, is not of such dangerous import as these discharges. Pus-forming organisms do

undoubtedly abound in recent desquamations. Dr. Klein was, however, as I have stated, unable to find his streptococcus in the desquamated scales. It would, however, be unsafe to neglect peeling as a possible vehicle of dissemination.

The author concluded by discussing the conditions essential to successful disinfection, and detailed certain instances where infection was conveyed by imperfectly disinfected articles, such cases otherwise presenting the characters of "return cases."

A NEW METHOD OF CULTIVATING THE TUBERCLE BACILLUS.—W. Hesse (*Zeitschr. für Hygiene und Infektionskrankheiten*, 1899, xxxi.) has conducted experiments with plain agar-agar containing "Nährstoff Heyden" in place of peptone. He has demonstrated a growth of the tubercle bacillus within a period of five to six hours. In cultures from tuberculous sputa the growth is sufficient for the demonstration of the tubercle bacilli in smears before the growth of other bacteria has masked the conditions. The growth in this short period is shown by the fact that the bacilli in smears from the culture have twice the dimensions of those in smears from the sputum.

He recommends the following technique: Pour 20 c.c. of the medium into a Petri dish, capacity 9.5 cm. in diameter. After coagulation, invert the dish, keeping it in this position in the subsequent manipulations. The sputum should be collected in a sterile glass dish. With a platinum-wire loop pick up a drop of the purulent mucus and rub it in a circle over the surface of the medium near the border of the dish. From this circle distribute twenty to thirty flakes of the mucus over the surface of the medium. Place the culture in the thermostat for twelve to twenty-four hours. Sterilize a cover-glass in the flame of a Bunsen burner, and place it over the mouth of an open reagent bottle. Remove the cover of the Petri dish, and bring one of the flakes of mucus in contact with the cover-glass. Remove the latter by introducing a platinum-wire loop under one edge, tipping the dish towards that edge. The cover-glass will then remain hanging by the opposite edge, and may be removed with forceps. If the flake of mucus does not attach itself to the cover-glass, touch the latter with a hot platinum-wire loop at the point where it is in contact with the mucus, in order to melt the medium slightly. Cultures should be kept in a moist chamber.

He gives the composition of the medium as follows:

Nährstoff Heyden	...	...	...	5 grammes.
Salt	...	...	...	5 "
Glycerin	...	...	...	30 "
Agar-agar	...	...	...	10 "
Normal sod. hydrate sol.	...	...	...	5 c.c.
Distilled water	...	...	...	1,000 "

The "Nährstoff Heyden" should be dissolved in a little water. After the other ingredients have boiled for about two hours it should be added, and the boiling continued fifteen minutes longer. Filter.

Hesse considers the method superior to the inoculation test in many cases.

If the method will enable one easily to find the tubercle bacillus in the "purulent mucus" of tuberculous sputa in which no caseous masses are present, it will be of much practical value.—*American Journal of Medical Science*.

THE COMPULSORY CLOSING OF PRIVATE SLAUGHTER-HOUSES UNDER A PROVISIONAL ORDER.

COMPENSATION TO OWNER BY ARBITRATION.

By J. H. GARRETT, M.B.

Medical Officer of Health of the Borough of Cheltenham.

CHELTEMHAM finds itself in the unfortunate position of possessing five-and-twenty old registered slaughter-houses. Clauses in two old Acts—namely, the Towns Improvement Clauses Act, 1847, and the Public Health Act, 1848—were adopted or incorporated in the Cheltenham Improvement Act, 1852, registration of the then existing slaughter-houses being thereby rendered compulsory, and the opening of new slaughter-houses forbidden, excepting by periodic license, to be granted at will by the sanitary authority.

There appears to have been no option as to registration, and any place where slaughtering took place had to be registered on the application of the owner. The requirement of registration was no doubt thought to be for the public benefit; it was necessary, in order that inspections might be made, to fix the places where slaughtering could be carried on. But the result of the registration has not proved the unqualified benefit one might have desired, since a right of perpetual user as slaughter-houses was thereby created for many old places, which were registered without due regard being paid to their fitness for the object for which they were used.

By preventing the creation of new places, except by license, a premium was put upon the places ordered to be registered, enabling the owners to let them at rentals out of all proportion to their intrinsic value as buildings or property considered apart from this right of slaughtering. Thus, in total disregard of the public right, and much to the public prejudice, a valuable monopoly was gratuitously placed in the hands of the fortunate owners of the hovels and places which happened, at that now distant moment, to be in use for the slaughter of animals.

In these more enlightened days we find it desirable to abolish these old slaughter-houses in favour of a central abattoir, the first reason being the well-recognised necessity of proper facilities for inspecting animals intended for slaughter, and meat intended for food of man; secondly, on account of the private slaughter-houses occupying most undesirable sites, and being badly adapted, from the point of view of structure, for the important purpose they

serve; and, thirdly, because slaughtering really constitutes an offensive trade, and in whatever degree it be regulated by bye-laws, some amount of nuisance invariably results from it, and this nuisance is reduced to a minimum by centralizing the business in a public abattoir.

The Public Health Act, 1875, confers upon sanitary authorities the power to erect public abattoirs, and in Cheltenham an abattoir has been designed and some part of it erected. The Public Health Act, however, does not deal with the complementary necessity of causing the butchers to use an abattoir when built by providing for the closing of their private slaughter-houses. The sanitary authority is consequently obliged to rely on the limited powers which may be acquired by the expensive and doubtful process of obtaining a private Act of Parliament, or a Provisional Order from the Local Government Board, the pith of which is sure to have been excised upon revision by the Board as altogether *ultra vires*, or as being beyond any powers that have yet been thought expedient to be granted.

The Cheltenham Corporation have obtained a Provisional Order containing the following powers:

POWERS AS TO CLOSING SLAUGHTER-HOUSES CONTAINED IN THE
CHELTENHAM PROVISIONAL ORDER, 1896.

1. The Corporation may from time to time, by written notice to the owner and occupier of any registered slaughter-house within the borough which, from its situation or construction, is, in the opinion of the Corporation, injurious to the public health, require that the premises shall cease to be used as a slaughter-house on and after such date (not being less than six months from the service of such notice) as may be specified in the notice, and no person shall after such date slaughter in the way of trade any cattle, horse, sheep, pig, on the said premises.
2. If any person acts in contravention of the provisions of subdivision (1) of this article, he shall be liable for each offence to a penalty not exceeding £5.
3. The Corporation shall make compensation to the owner and occupier of any registered slaughter-house who shall be injuriously affected by any requirement of the Corporation under subdivision (1) of this article, such compensation in case of difference to be settled in manner provided by the Public Health Act, 1875.

Under this Order notices were in due course served for the closing of one general slaughter-house, the worst in the town, and three pig slaughter-houses, which are mere "back-kitchen" kind of places. Then arose the difficulty as to compensation. On the part of the owners particularly exorbitant claims were sent in, and after a great deal of haggling and waste of time, the matter, as affecting

the ownership of the general slaughter-house, was referred to arbitration, the occupier, who held the tenancy on somewhat irregular terms, having accepted £30 for his compensation.

By mutual agreement, Mr. Oliver J. Williams, LL.B., Registrar of the Cheltenham County Court, was appointed sole arbitrator. The parties were respectively represented by counsel.

Mr. Olive, the owner of the slaughter-house, claimed the sum of £625 as compensation for compulsory closure of the buildings for the purpose of slaughtering, and the Corporation had offered him £264 without prejudice, which he had refused to accept.

Mr. Corner, in opening the case for the claimant, said that in one sense the slaughter-house was historic, since it was once used by John Higgs, whose epitaph upon a gravestone in Cheltenham parish churchyard reads:

"Here lies John Higgs,
A famous man for killing pigs;
For killing pigs was his delight,
Both morning, afternoon, and night.
Both heats and colds he did endure,
Which no physician e'er could cure.
His knife is laid, his work is done,
I hope to Heaven his soul has gone."

Mr. Corner further stated that in 1887 the butcher's shop and house facing the High Street, and the slaughter-house and yard behind, were let together for £53 15s. per annum. The tenancy fell vacant, however, in 1890, and remained unlet for a year. It was then let altogether as before, but at a rent of £40. During this tenancy the house and shop were separated from the yard containing the slaughter-house, etc., the latter being under-let (for £14 a year to Mr. Willis, the butcher who received compensation from the Corporation as occupier). Counsel admitted that the place was in close proximity to dwelling-houses, and the Corporation might be right in desiring to close it.

Mr. W. N. Olive (trustee for the late owner) stated that he thought £25 a year rent might be got for the premises. He estimated that £625, the sum of his claim, would bring in £25 a year at 4 per cent., but didn't know where he could invest trust-money at that rate. He did not think the premises (slaughter-house and all other buildings, with yard) would let for any other purpose at more than £3 a year.

Mr. W. Lawrence said he occupied this slaughter-house between 1869 and 1876, when he lived as a butcher in Cheltenham, and killed on an average ten bullocks and seventy sheep a week in it. He paid £20 a year, together with certain offal, which he valued

at £10 a year, for the slaughter-house and yard, and would have paid £50 a year for it. He could not tell the value of not being under Corporation red-tapeism and having a cordon drawn round you. The cost of the privilege of slaughtering at the abattoir was 1s. for each beast, and 3d. for each sheep. He thought it a great advantage to be able to slaughter when convenient, whereas the public abattoir was only open during certain hours. He was of opinion that £35 a year was a fair rent for the slaughter-house.

Several local butchers, being called, gave similar evidence to that of Mr. Lawrence.

Mr. F. B. Pottinger, licensed valuer, estimated the value of the premises at £20 a year, which, at twenty-two and a half years' purchase, amounted to £450, to which he should add 10 per cent. for compulsory closing.

Mr. J. G. Villar, auctioneer and valuer, gave £440 as his estimate of the value of the slaughter-house. The premises as such would let at £25 a year, but would probably not fetch more than £5 a year for any other purpose. His estimate was based on £20 a year at twenty years' purchase, with 10 per cent. added for compulsory closure.

Mr. A. Edmonson, president of the Leeds Slaughter-house Owners' Association, said that anyone killing half what Mr. Lawrence had killed in this slaughter-house would have had to pay £47 9s. a year for use of the public abattoir, which at twenty years' purchase amounted to £949. In his opinion the slaughter-house was worth £25 a year.

Mr. Egerton Brydges, after a brief opening on behalf of the Corporation, called :

Mr. J. Hall, C.E., borough surveyor, who gave a lengthy catalogue of the defects of the place. The walls, floor, drainage, etc., of the slaughter-house were defective. From neighbouring bedroom windows it was possible to see into the slaughter-house. The pens were old cottages converted, without adequate preparation, to their present use. To render the walls impervious, amend the drainage, etc., would entail an outlay of from £40 to £50. The conducting of slaughtering here would probably cause a nuisance.

Dr. J. H. Garrett, medical officer of health, stated the reasons which led up to the application for the Provisional Order, and said that this slaughter-house had been dealt with first under the Order because it was the worst general slaughter-house in the town, and one of the worst he had ever seen, and was quite unfit for the purpose to which it had been put. He gave some details of the surroundings and conditions of the place.

Mr. A. E. Hudson, chief inspector of nuisances, gave particulars as to the present condition of the place. He said the slaughtering apartment had a floor area of 16 feet 3 inches by 12 feet. The floor was of rough asphalt, broken and uneven, and the walls of roughly-finished brickwork. The lighting was deficient, and the bloodhole and drain defective. The slaughter-house was situated close behind the houses in the High Street, one room, much used by the occupants of the shop in front, being built close against the wall of the slaughter-house, etc. The place was in a dilapidated condition, and it would cost something like £200 to make it a good slaughter-house.

Mr. Seth Lewis, inspector of slaughter-houses, etc., for the London County Council, said he considered the premises quite unfit for a slaughter-house, and to bring them up to the London requirements would cost £200. He said further that the value of private slaughter-houses had greatly diminished with the increase of the foreign meat trade, and that the tendency was for all the lesser slaughter-houses to fall out of use. Since the year 1873 the number of private slaughter-houses in London had been reduced from 1,500 to 418, chiefly from the cause he had mentioned.

Mr. J. M. Carnie, inspector of meat at Birkenhead, corroborated the foregoing evidence as to the present condition of the premises, and the expenditure necessary to make it fit for use. With two exceptions, it was the worst slaughter-house he had ever seen.

Mr. H. Waghorne, butcher, and member of the Public Health Committee of the Cheltenham Corporation, said he hired an apartment for slaughtering at the public abattoir for his exclusive use, with use of lairage, etc., at an annual rental of £15 a year. He killed there on an average six beasts and thirty-five to forty sheep a week, and it was open to any butcher in the town to obtain the use of the public abattoir on the same terms.

Mr. R. J. Purnell, auctioneer and valuer, said he had made a valuation of the premises. He considered that the place, for the purpose of a slaughter-house, was worth £15 a year, but for any other purpose it was only worth £3 a year. He deducted the £3 from the £15, capitalized the £12 at twenty years' purchase, and added 10 per cent. for compulsory sale, making in all £264. He had told the Corporation that this was the sum he thought should be paid, but he had forgotten to make any deduction on account of the dilapidated condition of the premises, and the necessity of the immediate expenditure of a considerable sum should the place be used again as a slaughter-house.

Mr. G. Hone, valuer, said the outside rent that could be obtained for the premises was £15 a year.

On behalf of the Corporation, some other evidence was given, and it was stated that the freehold of a registered slaughter-house in Cheltenham, with lairs, yard, stables, etc., all in a superior structural condition to the premises in question, had been sold within the previous year for the sum of £275.

AWARD.—A few days later the arbitrator issued his award for £198. Each party to pay their own costs. He appended the following memorandum:

I find the net cost to be at the very most £12 a year. On account of the age, bad state of repair, and, in part, ruinous state of the premises, I capitalize this at fifteen years' purchase.

This would be	...	...	£180	0	0
Add ten per cent. for compulsory taking	...	...	18	0	0
according to the usual custom	...	...			
Total amount to be awarded	...	...	£198	0	0

THE ABATTOIR OF BIARRITZ.

By ALICE L. CUMMING, M.B., C.M., D.P.H. CAMB.

In the present crusade against tuberculosis, the municipal control of the slaughter of animals for food and subsequent inspection is a matter of vital importance. Throughout Great Britain this control is exercised only in comparatively few of the larger towns. It may be of interest to describe the plan and general management of the public abattoir of Biarritz, as the arrangements there seem capable of being adapted to the needs of small towns in this country.

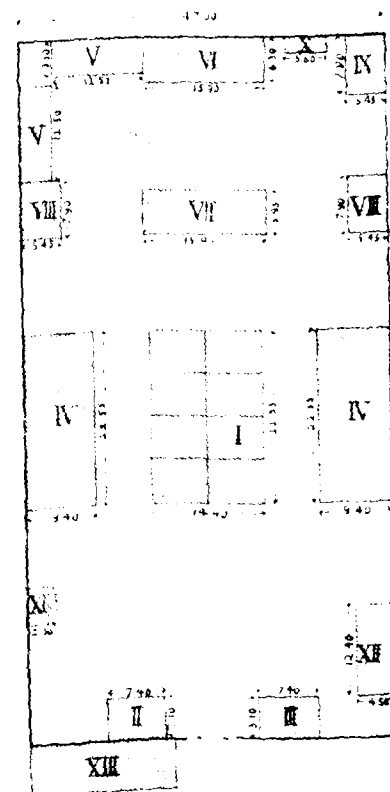
Biarritz is a town of 10,000 inhabitants, but receives during the year about 20,000 visitors, as it is well known and appreciated as a health-resort in early spring by the English, and as a summer watering-place by the French and Spaniards.

Until 1898, although the slaughtering of animals for food was carried on under the control of the town officials, only sheds in somewhat close proximity to dwelling-houses were available for the purpose. In that year the present abattoir was opened, situated about 1½ miles from the town, in an isolated position among the sandhills, overlooking the sea.

The following is a plan of the abattoir, which consists of a large space (295 feet by 154 feet) enclosed by high walls, within which are sheds for the reception of animals before slaughter, a large

central building of one story (i), divided into apartments, where the animals are killed, and other buildings used as scalding (vi), salting (ix), and tripe houses (viii).

Outside the entrance-gate there is a shed (xiii) where the animals are sheltered while awaiting the daily visit of the veterinary surgeon, who examines them before admission. If passed as



EXPLANATIONS.

- | | |
|---------------------|--------------------|
| I. Killing rooms. | VII. Tallow house. |
| II. Porter's lodge. | VIII. Tripe house. |
| III. Office. | IX. Salting house. |
| IV. Cattle lairs. | X. Lavatories. |
| V. Pig pens. | XI. Manure pit. |
| VI. Scalding house. | XII. Stables. |
| | XIII. Shed. |

healthy and sound, the animals are taken into the abattoir and weighed. The town dues and fees for the use of the abattoir are paid at the office (iii), and each animal is given a number, according to which the butchers take their turn of the killing-rooms in rotation. Separate lairs are provided for oxen, sheep, pigs, and wild bullocks, above being stores of bedding and food-stuffs. All

animals must remain at least twenty-four hours in the abattoir before slaughter, with the exception of calves, which may be killed immediately on being brought in. During this interval the animals must be supplied with food and water, the bedding being provided by the authorities, who retain and dispose of the manure.

The large central building (I) is divided into eight compartments for the slaughter of oxen, cows, and sheep (pigs are killed in a separate building); and each compartment is lighted from the roof, has a water and gas supply, and walls and flooring composed of cement, impermeable and easily cleansed. After slaughter, during which the doors are closed, the carcasses are dressed and hung upon suitable pulleys; the liver, heart, and lungs are also exposed for inspection, and the intestines and offal are taken to the tripe-house. The scalding-house (VI), where the pigs are killed, has also cement walls and flooring, with gutters for waste-water, and hot-water pipes lead to cemented tubs for scalding and scraping the skins. Fresh hot water must be used for each animal, and the fuel required is paid for by the pork-butchers.

The inspecting officer, a veterinary surgeon, in the pay of the municipality, visits the abattoir once daily in winter, and twice daily in summer, and all animals or parts thereof considered by him to be unsound and unfit for human food are confiscated, soaked in petroleum, burnt, and buried in the presence of the employés of the abattoir. All sound meat is stamped at the time of the inspection, and a special indelible ink is employed, with a combination of letters changed daily to prevent fraudulent imitation.

Compensation to the value of the animal seized is given by the State to those butchers who, before slaughter, declare the fact that their animal is unhealthy.

Scrupulous cleanliness is enforced by the management. Each butcher has to scrape and wash the walls and floor of the compartment he has used and leave it ready for the next-comer. All solid refuse is taken to the manure pits, which are emptied daily in summer, and every second day in winter, and all waste water is led into a large tank outside the walls, which is emptied at each high tide.

Receptacles are provided for butchers who desire to collect blood or tallow (VII) for commercial purposes, but the blood must be removed daily, and the tallow every five days in the summer. In cold weather a longer time is allowed.

The butchers have the use of the tripe-house (VIII) for cleaning and cooking of tripe. No internal organs may be removed from it unless properly cleansed. Each butcher pays for his own fuel,

provides the necessary utensils for his business, and must keep these clean, and thoroughly wash out the place after use.

According to municipal regulations, no animals—viz., oxen, cows, calves, sheep, lambs, pigs—intended for food may be killed in Biarritz elsewhere than in the public abattoir, except in the case of farmers who kill pigs for their own use, and then only if an enclosed space, apart from the public road and conforming to sanitary regulations, is used.

Animals must be brought directly to the abattoir, and may not be taken into the town and retained there in any stable or cowshed.

The veterinary surgeon has the same right to confiscate unsound dead meat brought into the town from a distance, and must examine all such meat brought in, only that bearing the stamp of some other recognised abattoir being allowed to pass unchallenged, if within a certain number of days from the date on the stamp.

In the public market the *commissaires de police* keep watch to see that no unstamped meat is sold. The points to notice are:

1. The favourable hygienic position of the abattoir preventing probability of nuisance.
2. The inspection of animals both before and after slaughter.
3. The giving of compensation in certain cases.
4. The absolute cleanliness and order which everywhere prevail.
5. The avoidance of unnecessary cruelty by killing the animals in separate compartments, with closed doors.

There are relatively few cases of tuberculosis detected among the animals. Perhaps the use of oxen and cows as beasts of burden, and the climate, which permits them to be out of doors almost the whole year, may be partly the cause of this freedom.

PUS IN MILK.—The St. Pancras Vestry recently submitted certain samples of milk for bacteriological and microscopical examination, with the result that in five of the samples pus was reported to be present. The matter was referred to the Health Committee of the vestry to consider how far it was possible to take legal action for the sale of such milk under the Public Health (London) Act, 1891, as unsound food; and the committee submitted the question for the opinion of counsel. Acting upon this advice, the committee recommended that summonses should be issued on behalf of the vestry against the cow-keepers in each of the cases where pus was found to be present. There was a lengthy discussion at the vestry upon this recommendation, and it was rejected. An amendment to the effect that cow-keepers and persons engaged in the distribution of milk in St. Pancras should be informed that all samples of milk taken by the inspectors under the Food and Drugs Acts would in future be subjected to bacteriological examination, and where the analysis justified it prosecutions would be issued, was carried.—*British Food Journal*.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

Northern Branch.—An ordinary meeting of this Branch was held at Dr. Armstrong's office, Newcastle-on-Tyne, on Friday, May 25th. There were present: Drs. Armstrong, Stainthorpe, Taylor, Green, Morison, Gofton, Wilson, and Scurfield.

The minutes of the last meeting were read and signed.

The discussion on the notification of erysipelas was resumed, and the following resolution was unanimously adopted:

"That at the conclusion of the present year the members of the Northern Branch who are medical officers of health be requested to furnish a return to the Secretary of the Branch showing the number of cases of erysipelas notified in their districts during as long a period as possible, and the proportion of such cases which have been multiple, i.e., which have occurred on the same premises at such dates as to suggest the spread of the disease by infection."

Dr. ARMSTRONG read a paper entitled "The Sale of the Flesh of Tuberculous Cattle for Human Food."*

A discussion followed, and the following resolution was unanimously adopted:

"That the Council of the Society be requested to inquire of the Branches as to how far they approve of the instructions issued by the Local Government Board for the guidance of medical officers of health with regard to the inspection and seizure of the meat of tuberculous cattle, and whether, in spite of these instructions, it is desirable that a medical officer of health should exercise his own judgment and opinion as to when, if at all, the flesh of tuberculous cattle is fit for human food."

Yorkshire Branch.—The annual dinner of the Branch took place on Thursday evening (May 31st) at the Hotel Metropole, Leeds. Dr. T. B. Fairclough (Mirfield), the President of the Branch, occupied the Chair, and some fifty medical officers of health from all parts of Yorkshire sat down to dinner along with distinguished guests. Among the latter were Professor T. Clifford Allbutt, Cambridge University, and several other enthusiasts in sanitary work.

After the usual loyal toast, "The Army and Navy" was fittingly proposed by Dr. FORSYTH and replied to by Dr. J. WRIGHT MASON, Medical Officer of Health, Hull (Captain 2nd E.R. Yorks Artillery Volunteers), and by Dr. W. S. MACKENZIE, Medical Officer of Health, Normanton (Lieutenant-Colonel 1st Battalion West Yorkshire Light Infantry Volunteer Corps).

The toast of "Our Society" was then felicitously proposed by Professor T. CLIFFORD ALLBUTT, who enlarged upon the exceedingly valuable

* See p. 714 of this issue.

results which had, within the range of his own memory, been accomplished by medical officers of health and preventive medicine. He illustrated this by referring to the extreme rarity or absence of such diseases as malaria, typhus fever, and the plague, which formerly flourished in this country, but were now unable to obtain a foothold, and he maintained that this revolution was largely due to the advancement of sanitary knowledge promoted by medical officers of health and kindred societies. Professor Allbutt referred with enthusiasm to the exceedingly valuable work which is at present in hand with regard to the prevention of tuberculosis, and he confidently believed that in time this scourge will become as rare as typhus fever is now. As to cancer, the speaker admitted that we knew little, although the weight of evidence is undoubtedly on the side of its being an infective disease. He urged his hearers in their capacity of local medical officers and otherwise to lose no opportunity of tracing out the localization and distribution of cancer, and he gave illustrations of the manner in which such inquiries had been made to yield invaluable results bearing upon the public health aspects of cancer. When he reflected that tuberculosis can be abolished, that malaria and plague have been absolutely abolished in this country, and that typhus and cholera can get no footing, and when he remembered that all this had been accomplished in the short lifetime of one man, he was confident in thinking that even cancer may be wiped off the slate.

Dr. J. SPOTTISWOODE CAMERON responded on behalf of the Society, and thanked Professor Allbutt for the cheering influence of his presence and his toast. He was sorry to say that in Leeds they still had an occasional case of typhus fever, although it was true to say that the disease had ceased to exist in the way it did at the time to which Dr. Allbutt had referred. With regard to tubercle, the Leeds Corporation were doing what they could to bring about the desired abolition of the disease, and were particularly anxious to exercise a control over the milk supply in this respect. A large part of the credit of reducing the mortality from infectious disease should be given to the engineers who had carried out large schemes of sanitary works, etc., and also to the sanitary inspectors, who acted as the hands and eyes of medical officers, and who were daily becoming a more valuable and expert body of men. No small share of the credit should also be given to those members of our sanitary authorities who devoted their time and strength voluntarily in trying to improve the condition of the towns and villages in which they lived.

Dr. J. R. KAYE, as Honorary Secretary, also voiced the thanks of the Society for the very kind way in which the toast had been proposed by Professor Allbutt. The Professor was no stranger to the Society, having been elected an honorary member fifteen years ago, when the ranks of the Branch embraced less than half the present number. Dr. Kaye referred to the important crusade against tuberculosis, and explained that the West Riding County Council were enthusiastically in favour of the fullest supervision of milk supplies for the eradication of tuberculosis, but they felt strongly that this should be accomplished in an equable and uniform manner by public legislation for every town and village in the country. He demurred somewhat to the piecemeal legislation, which might operate in the way of sending the good milk supply into one quarter and leaving the suspicious milk to be consumed in the unprotected places of the country.

After an interval for music, Dr. H. MACLEAN WILSON gave the toast

of "Our Guests," which was replied to by Professor ALBUTT, Professor C. J. WRIGHT, and Mr. Councillor E. E. LAWSON (Chairman of the Sanitary Committee of the Leeds Corporation).

"The President" was eulogistically proposed by Dr. E. ARNOLD EVANS (Medical Officer of Health, Bradford), and fittingly replied to by Dr. T. B. FAIRCLOUGH.*

North-Western Branch.—The ordinary monthly meeting of this Branch was held at the rooms of the Chemical Club, Manchester, on Friday, June 8th.

The following members were present: Drs. Hayward (President), Berry, Brindley, Garstang, Graham, Harris, Hanson Smith, Wheatley, Wilkinson, and Meredith Young.

The minutes of the last meeting were read and confirmed.

The members then proceeded to the premises of the Manchester Pure Milk Supply Company. They were shown the various processes by the manager, Mr. Thompson, and the dairy expert, Mr. Sorensen. Mr. Sorensen explained that the dairy was managed on the same principles as the well-known one at Copenhagen. By paying a higher price to the farmer for his milk, they were able to impose certain conditions. The cows are examined every month by the veterinary surgeon employed by the company, and they are subjected to the tuberculin test every six months. Any cow which reacts or shows clinical symptoms of tuberculosis has to be removed from the farm at once. Strict precautions with regard to cleanliness of the cows and cowsheds are enforced. Any case of infectious disease at one of the farms is at once notified to the company. In these cases the company pays the employé's wages whilst he has to be isolated, and in this way any inclination to hide a case is minimized. Having ensured, as far as possible, that the milk is only collected from healthy cows, and that it is collected in a clean manner, attention is directed to prevent further contamination or any increase in harmful matter that may have gained access. The milk is cooled at the farm immediately after milking. On arrival at the dairy it is put into ice-tanks, and afterwards filtered through gravel. It is sent out to the consumer in bottles or in milk-cans. The construction of the cans is such as to prevent any possibility of the person taking it out and tampering with it, and contamination by dust whilst drawing the milk off is carefully guarded against. By these precautions it is found that the milk will keep sweet for twenty-four hours, and that it is only necessary to deliver it once a day, a considerable saving being made in this way. Some sterilized milk is sold by the company, but its sale is not encouraged. The principle upon which the company works is that if milk be only collected from healthy animals, if it be collected in a clean manner and kept cool afterwards, it is a safe food without sterilization.

The members were much impressed with what they saw, and it seemed to be the general impression that establishments of this kind if general would do much to solve the "milk problem."

Southern Branch.—The annual meeting of the Branch was held at Emsworth on Wednesday, June 20th, 1900. There were present: Drs. Lockhart Stephens, C. H. Kelly, H. Stott, A. M. Fraser, A. Griffith,

* From the *Leeds Mercury*, June 2nd, 1900.

A. S. Bostock, J. Groves, C. Sturges Jones, A. W. Harris, B. Browning, A. Newsholme, W. G. Willoughby (Hon. Secretary), and Inspector-General A. Turnbull, M.D., as a Visitor.

The report of the Council meeting, which had been previously held, was read and adopted as follows:

1. OFFICERS FOR 1900-1901.

President: DR. A. W. HARRIS (Southampton).

Vice-Presidents: The EX-PRESIDENTS and DR. MUMBY.

Representatives on the Council of the Incorporated Society:

DRS. KELLY and GROVES.

Hon. Secretary and Treasurer: DR. WILLOUGHBY (Eastbourne).

Council: The above, and DRS. GRIFFITH, BOSTOCK, STOTT, STURGES JONES, NORMAN, FRASER, and PARKINSON.

2. *Accounts.*—These were read and approved, showing a balance in favour of the Branch.

Resolved—

That certain expenses in connection with the Annual Provincial Meeting at Brighton be paid by the Branch, the amount not to exceed £10.

A communication from the Incorporated Society *re* the Classification of Diarrhoea Deaths was read.

Resolved—

That the Incorporated Society be informed that, owing to heavy expenses for such a small Branch, this Branch is unable to contribute to the cost of distributing the circulars *re* the Classification of "Diarrhoea" Deaths, but the members pledge themselves to distribute, free of cost to the Society, the circulars in each of their districts if the Society wishes.

A second communication from the Incorporated Society *re* the Fixity of Tenure of Office and Superannuation was considered, but no resolution was passed thereon.

It was moved by Dr. GROVES, and seconded by Dr. BROWNING:

"That in the opinion of this Branch the Midwives Bill at present before Parliament does not afford sufficient protection for the community against the practice of unqualified persons, and this Branch suggests that the amendments of the British Medical Association should be supported by the Society."

This motion was carried *nem. con.*, about half of the members present not voting.

Dr. Hawkins, Medical Officer of Health of Weymouth Rural District, was nominated by Dr. BROWNING for membership of the Branch, seconded by Dr. WILLOUGHBY.

The members adjourned to visit various places of interest in public health, including the oyster-beds, an excellent cottage hospital, founded and carried to its present successful position by the Medical Officer of Health of Emsworth, the infectious diseases hospital, etc.

Dr. Lockhart Stephens, Medical Officer of Health of Emsworth, entertained the members present to lunch, for which he received the thanks of the Branch.

FORMATION OF A SOUTH AUSTRALIAN BRANCH OF THE SOCIETY.

A MEETING of the Medical Officers of Health of the Colony of South Australia was held in Adelaide on May 4th, when there were present: Drs. Borthwick, Evans, C. Bollen, H. H. Wigg, W. J. Gregerson, J. Finnis, J. C. Souter, Stevenson, Feige, Chenery, Letcher, Coombe, P. Bollen, Lermite, Maher, Popham, and E. Brookes. A letter having been read from the Secretary of the Incorporated Society stating that the Council had given its consent to the formation of a Branch in South Australia, those present unanimously resolved to form themselves into a Branch to be called the South Australian Branch of the Incorporated Society of Medical Officers of Health, and elected Thomas Borthwick, M.D., as President, W. J. Gregerson, L.R.C.P., as Secretary, and Drs. J. H. Evans, C. Bollen, and C. J. Lermite, as members of the Council of the Branch.

MEETINGS FOR JULY.

- July 4th, Midland Branch, at Birmingham.
- „ 5th, West of England and South Wales Branch, at Cardiff.
- „ 12th, Home Counties Branch, at London.
- „ 13th, North-Western Branch, at Manchester.
- „ 27th, Northern Branch, at Newcastle-upon-Tyne.

VACCINATION AT READING.—Dr. Ashby, the Medical Officer of Health, having directed attention in his annual report for last year to the increasing proportion of children remaining “unaccounted for” as regards vaccination (the proportion being no less than 61 per cent. of the births registered in 1898), the Sanitary Committee recommended that the Council should call the attention of the Local Government Board and of the Guardians of the district to the matter. The recommendation of the committee was rejected by the Council chiefly on the ground that such resolution would be a slur on the Guardians and an interference with their jurisdiction. The Guardians are apparently elected on the “anti-vaccination” ticket. From Dr. Ashby's report, it appears that only twenty-seven certificates of conscientious objection were taken out during the past year. The Local Government Board will have Dr. Ashby's report and the return by the vaccination officer before them, and it is to be hoped that some steps will be taken to give effect to the law.

DIPHTHERIA IN RURAL DISTRICTS: DIPHTHERIA EXPERIENCE AT KEIGHLEY.*

Dr. KAYE opened the discussion with a résumé of the principal points noted in these papers. He considered the two papers a happy combination, because they reflected to a large extent the opinions of medical officers of health as to the cause and dissemination of diphtheria. One favoured local insanitary conditions as the chief factor in the production of this disease, while the other considered the most potent influence to belong to school attendance. The experience at Keighley was very interesting because it showed that the outbreaks were undoubtedly influenced by the closing of the infant and junior departments on three occasions, while, on the other hand, the reopening on each occasion produced a fresh crop of cases. Both papers advocated very warmly the use of antitoxin, not only in pronounced cases, but also as a prophylactic in the other members of an infected household.

Dr. CAMERON felt that observers with regard to the aetiology and dissemination of the disease ought to throw aside all old opinions and begin anew. Many cases occurred in insanitary houses, but the difficulty lay in ascertaining the relation of the disease to such premises, because of the want of correct knowledge as to the number of houses sanitary and insanitary in a given district. School attendance he considered had a local rather than a general influence, and the disease was epidemic rather than endemic. In the city of Leeds there had been many cases recently. The houses and their drainage were no doubt now in a better condition than they were 20 years ago, so that the recent outbreak could not be due to the same sanitary defects. House drainage had been severed from the sewers, trapped and disconnected, but another danger had arisen in the production of numerous small gulley-traps or cesspools, which were seldom cleaned out, and often became offensive. This decomposed liquid helped to cause the sewers to emit offensive stenches in hot weather. In his opinion this was a contributory cause in the production of diphtheria, although he might mention that in some parts of the city there were catch-pits with no prevalence of the disease. Generally speaking, he was driven back to personal infection for an explanation of the distribution of diphtheria, and he believed that this occurred more in the household and not so much in the schoolroom. The great difficulty to contend with was the recognition of early cases. Teachers should exclude all cases of sore throat from school.

Dr. MITCHELL WILSON said he had no theory as to the origin of the disease. It was now prevalent in two districts after an absence of five years, and although active measures had been taken to eradicate the disease, it was spreading even in good houses. The children attended quite a number of schools, and therefore he failed to associate school attendance with the dissemination of the disease in this case, though recognising the influence of school attendance. He personally considered that insanitary conditions had a large influence in producing the disease, and referred specially to unmade streets and unpaved backstreets, which he spoke of as the playground of children. He experi-

* Adjourned discussion by Yorkshire Branch, March, 1900. For papers, see PUBLIC HEALTH, xii, 354 and 359 (February, 1900).

enced a difficulty in dealing with the disease because of the absence of notification of the early cases, and in his opinion 50 per cent. of diphtheria deaths occurred because the medical attendant was called in too late.

Dr. THORP observed that in his district there were many damp dwellings, drainage not the most efficient, and sewers which might be improved; still, he had very few cases of the disease, and never experienced any epidemic.

Dr. LAWSON also related his experience, and expressed the opinion that diphtheria was not associated with insanitary conditions, as is often thought.

Dr. WELLBURN accounted for the difficulty in dealing with the disease because of the mildness of the primary stages in many cases, and, further, the extraordinary variation in the lengths of infection. In his district he ascribed most of the cases as due mostly to school attendance.

Dr. DEVILLE was in favour of insanitary conditions in the production of diphtheria.

Dr. GREEN considered that much trouble arose from the premature admission of children to the school after suffering from the disease.

Dr. STORR related his experience as to the usefulness of antitoxin not only in the treatment of the actual disease, but also in cases of suspicious sore throat.

Dr. HICKS expressed his gratification at the criticism of his paper, and said it would appear there was a great need for prolonged observation as to the development and dissemination of the disease. No one present would deny the influence of school attendance, which provided the medium for mouth to mouth infection. He had an idea that polluted drinking water was at times a vehicle in the dissemination of the disease. He would insist upon dual notification. Too frequently the medical attendant assumed the responsibility, whereas the parents should also have kept before them their responsibility.

THE ROLE PLAYED BY FLEAS OF RATS AND MICE IN THE TRANSMISSION OF THE PLAGUE.—Galli-Valerio, in the *Centralblatt für Bakteriologie* for January 6th, 1900, discusses this subject. He refers to an article by Simond, in which this author claims that he has observed in a certain number of plague cases blisters somewhere on the surface of the body which contained the plague bacilli, and which he thought were due to the bites of fleas from rats and mice. Simond was furthermore able to find in the intestinal canal of such fleas bacilli of the plague. This paper of Galli-Valerio concerns itself with the discussion of the possibility of human beings being infected in this way. The writer shows that the fleas which inhabit rats and mice are quite different from those which inhabit the human being, and he further notes that he was unable in any instance to get fleas from rats and mice to bite human beings. He therefore comes to the conclusion that the work of Simond is far from being conclusive.—*Albany Medical Annals*.

EPIDEMIOLOGICAL SOCIETY.

ON IMMUNITY AND RESISTANCE AS FACTORS IN THE EPIDEMICITY AND ENDEMICITY OF INFECTIVE DISEASES.*

By HERBERT E. DURHAM,
Grocers' Recess Scholar.

It may be laid down as an axiom that persons or animals which are harbouring the specific organisms of diseases affecting human beings are to be regarded as dangerous to the community. It may be likewise deduced that if such individuals are actually suffering from typical attacks of a given disease, they are more likely to be dealt with as such than if they are suffering from unrecognisable or unrecognised forms of the disease, and still more than those that are not suffering at all, although more or less infested with the causative agent of the disease.

In comparatively recent decades there was an optimistic belief that the "specific infective maladies were characterized by very definite adherence to type;" for it was not appreciated that a given infective agent might cause extremely different symptoms according to the nature of the individual infection. To take an example: an organism like the pneumococcus may give rise to a typical pneumonia, to an empyema, to an acute cerebro-spinal meningitis, or to an acute osteomyelitis, or to a purulent peritonitis, whilst each of these may demand special forms of clinical treatment; yet, so far as concerns their actual ætiology, they are one and the same disease. But, beside such differences, which are due to varied manner of manifestation, we have to recognise variations in intensity of attack. The intensity of attack depends upon two main factors, both of which are variable according to laws of which we have as yet but little knowledge. One of these factors is the variation in resistance of the host, the other is the variation of the infective agent; the latter may vary in its infective or resisting power, or in its power of poison-production, or, again, in both of these.

At present we are concerned with the variations in receptivity of the host; and with our scanty knowledge of the laws which govern the variations of the parasite, this side of the question may be left alone. It is well known that different individuals, varieties, and species vary considerably in their susceptibility to virulent organisms; they may be more or less refractory by nature, or they may have acquired a specific immunity, either by reason of the direct action of the agent upon them, or by reason of transmission of such acquired immunity in some degree from their mother (the transmission of the agent may also happen).

In any case, whether the proneness to resist infection be due to a non-specific resistance or to a specific immunity, it must be remembered that their powers are limited. We know of no instance of either a naturally refractory animal, or of an artificially specifically immunized one, which is proof against the introduction of a sufficient amount of a sufficiently virulent material.

We may distinguish three classes of individuals for present purposes:

* Read at a meeting held May, 1900.

1. Those who have recently had attacks and are considered recovered; here, in so far as their recovery is due to specific reaction against the cause, their recovery or resistance to continuance of the malady is of a specific nature.

2. Those who have had attacks at more remote periods, but who have retained sufficient specific antagonism to resist illness when exposed to possible infection; here the mechanism is specific.

3. Those who have never suffered from an attack, so far as can be ascertained. Of these subdivisions must be made: (a) those who have entirely escaped the influence of the infecting agent, non-specific; (b) those who have passed through unrecognised or unrecognisable attacks, specific; and (c) those to whom some specific immunity has been transmitted (not truly inherited from) by the mother, who herself may belong to either of the classes given.

Individuals (both man and lower animals) may be carriers of the given infecting agent, to whichever of the classes they may belong.

In respect to Class 1, it must not be assumed that when an individual has apparently recovered he has necessarily ceased to harbour the infective agent. Infective agents will be of greater importance if they are carried on the surface, or passed in excretions, than if they are confined to latent foci within his system. In the case of diphtheria, it is well known that *B. diphtheriae* may persist about the upper air-passages for months after apparent recovery from all illness. In enteric fever cases, the *B. typhi abdominalis* may persist in the urine for considerable periods (Petruschky, Horton Smith). In plague, cases have been described where *B. pestis* continued in the sputum thirty to forty-eight days after the complete cessation of fever, and when the diphtheria patients were apparently well (Gottschlich). The bacilli thus found were proved to be fully virulent for guinea-pigs.

It will probably be admitted that in such cases an individual, though apparently well restored to health, may really be a danger to his fellows.

As an instance of refractory animals retaining infecting agents, some experiments with the *Micrococcus melitensis* may be cited. Guinea-pigs are comparatively refractory to this organism; of a number of these animals which were infected, some died at considerable periods after the injection; the longest survivals were seventy-four and ninety-four days; in both of these the presence of the coccus was determined in certain of the organs as well as in the urine. Other animals which survived four, six, eight, and ten months were killed, and cultures were made to see whether the coccus was still present. In all of the cases the coccus was found, generally abundantly, in the urine.

(a) Killed after four months' growth only from kidney and urine.
(b) Killed after six months, large piece of spleen and loopful of urine both gave growth; other organs nil.

(c) Killed after eight months' growth from local caseous nodule, kidney (large piece), spleen (loop), femoral marrow (all from one femur), and urine (one drop).

(d) Killed after ten months' growth from two drops urine; organs (both large pieces and single loops remained sterile).

These observations are not without interest in showing with what tenacity an organism may remain in the urine of an animal* and be diffused by it. (It may be noted that no case of "laboratory infection" occurred during the course of these observations.) From this we

* Birt and Lamb failed to find the micrococcus in the urine of the human cases examined by them.

may pass to diphtheria. It has been found by a number of observers that the blood-serum of some untreated horses ("normal") possessed a more or less considerable quantity of a substance which had the power of neutralizing diphtheria toxin; the most carefully worked out cases are those of Dr. Cobbett, who showed that the relations of the neutralizing substance with different diphtheria filtrates agreed with those possessed by proper antitoxin of diphtheria; and that, so far as present methods go, there was no doubt that the substance in question was truly diphtheria antitoxin. At the same time it must be stated that a very considerable number of horses have been tested, and shown to possess no appreciable neutralizing power whatever in their serum. The presence of the antitoxin is, therefore, no normal condition of the horse, and the inference is that it is an acquired character. It may be doubted whether such a character can be acquired without the presence and action of the diphtheria bacillus or its products. Horses, I believe, are not known to be affected with diphtheria as such; but it does not follow that they may not harbour the bacillus at times in such a way as to engender the production of true antitoxin.

Whatever interpretation may be placed upon these data, the possibility of the horse acting as a disseminator of diphtheria cannot be entirely excluded.

From these considerations we are led to deal with the presence of apparently virulent diphtheria bacilli in the throats of persons who are not suffering from manifest illness, and the presence of neutralizing power of the blood-serum (for diphtheria toxin) of persons who are not known to have had diphtheria.

Many observers have recorded instances where diphtheria bacilli have been demonstrated in the throats of persons not suffering from the malady; several of these were, more or less, in attendance upon diphtheria patients. The serum of persons who had not suffered from diphtheria has been examined by a number of observers. Wassermann found that of the sera taken from thirty-four adults, as many as twenty-eight showed definite power of neutralizing diphtheria toxin: in most of the cases 1 c.c. of the serum was able to neutralize ten fatal doses when given in mixture; in the remaining cases no neutralizing power could be found. He also examined seventeen children of one and a half to eleven years of age; four of these had no neutralizing power, and in two there was delay in the time of death of the guinea-pigs, when, as before, ten fatal doses were given with the serum; the remaining eleven showed strong neutralizing power. Fischl and Wünschheim also found neutralizing power in sixty-eight out of eighty-two samples of serum obtained through the umbilical cord from placenta (i.e., blood of the child); in some instances 1 c.c. was able to neutralize twenty fatal doses of diphtheria toxin.

Perhaps the most interesting investigation of this sort is that of Loos, who examined the blood-serum of a number of children. One of these was tested, and found to have little or no neutralizing power; later, it became affected with diphtheria, and was again examined on two occasions—fifteen and sixty days after the illness. In both of these samples antitoxic action was found—more markedly, however, at the second examination. Two other cases failed to show action during the course of diphtheria; but examination after recovery showed that they, too, had acquired it. Lastly, in two children who were healthy, but in whose throats virulent cultures of diphtheria bacilli were obtained, strong antitoxic property was discovered in the serum. Such modes of inquiry are worthy of further study, especially in cases where healthy

individuals are found to be harbouring true diphtheria bacilli. In the children's portion of the Charité Hospital in Berlin there had been frequent outbreaks of diphtheria; it was consequently decided to make routine prophylactic injections (200 immunization units every three weeks). During a period of five months (Slawyck) observations were made upon 100 children. In twenty-four instances diphtheria bacilli were found in the throat without any symptoms accompanying their presence; in four cases diphtheria occurred. In respect to these, it is stated that, for certain reasons, prophylactic injections had not been properly carried out. It is not possible to be certain whether the twenty-four children, or some of them, would have escaped illness notwithstanding the bacilli, if the serum had not been given; moreover, their serum was not tested for neutralizing properties. Still, it is not impossible that the occurrence of the malady in the wards may have sometimes been spread from such individuals amongst whom the presence of diphtheria bacilli had not been suspected. When an individual has a considerable degree of natural resistance (as in the case of the rat), or acquired immunity, either passive by serum or active by absorption of bacillary products, it certainly is an advantage to the individual; but, in so far as he may unsuspectingly carry about virulent diphtheria bacilli, his peculiarity may be disadvantageous for his fellows.

Recently I have paid some attention to the dysentery which occurs in lunatic asylums, and which does not appear to differ materially in its nature from the dysentery of other countries. It appears probable that the disease is transferred from one individual to another, by some more or less direct means. Besides the cases which are recognisably dysenteric, one finds that a good many cases of intermittent or protracted diarrhoea occur. Occasionally opportunity is afforded of examining the condition of the colon in such cases, and in several instances it has been found riddled with ulcers of a nature resembling those seen in the less highly acute dysenteric cases. It is probable that these cases of diarrhoea form links which assist in keeping the disease endemic, especially as they do not give any apparent reason for care in the disposal of things which may have been infected.

It is, of course, impracticable to deal with every member of a community, and it would be especially difficult in the case of those who do not suffer during an epidemic. But it should be remembered that it may not be the severe cases and the slight cases only which contribute to the origin and spread of a disease. It is possible that the causative agents may be carried by individuals who, by reason of natural insusceptibility or by reason of an acquired specific immunity, may show no signs that they are doing so. It may, therefore, sometimes be of value to search for objective signs (specific organisms) amongst such apparently unpromising material. As a modification of an old commonplace saying, "Whatever you do with the pounds, pay some attention to the pence."

NOTIFICATION OF MEASLES.—The Newquay Urban District Council have resolved to ask the Local Government Board to consent to the removal of measles from the list of diseases to be notified. The resolution was arrived at in spite of the recommendation of the medical officer of health, and arose from the fact that an expenditure of £20 had been incurred in consequence of an epidemic which prevailed there during the early part of this year. Two members of the Council expressed the opinion that the notification of the disease had saved the town from an epidemic last year.

CONFERENCE ON TUBERCULOSIS.

A VERY successful conference on this subject was held at the end of April last in Glasgow, when the following resolutions were unanimously adopted. No resolutions appear to have been brought forward as to the steps requisite to give effect to the resolutions.

1. "That, in the opinion of this Conference, it is essential, in the interests of the milk consumer, that full advantage be taken of the powers contained in the Dairies, Cowsheds, and Milkshops Order of 1899, and that, in order to obtain such, each authority should provide for the regular inspection of its dairy cattle by the appointment of a veterinary surgeon for the purpose.

"Further, that in order to secure uniformity in the exclusion from the meat-supply of the flesh of tuberculous animals, advantage should be taken by each local authority of the powers provided in Section 43 of the Public Health (Scotland) Act, 1897, for the provision of definite places for the inspection of animals slaughtered for food purposes within its boundary, and that meanwhile the standard of condemnation to be applied should be that described in the report of the Royal Commission on the subject.

"Further, it is essential, in the interests of the consumer, that he should be protected against the dangers arising from imported milk and imported meat.

2. "That all byres shall conform, within the space of, say, twelve months from the time of the regulations coming into force, with the following conditions:

- (1) An impervious floor.
- (2) A plentiful supply of good water for flushing.
- (3) Proper drainage.
- (4) A depot for manure at a sufficient distance from the byres.
- (5) A minimum cubic content as regards such districts of 600 cubic feet for each adult beast.
- (6) A minimum floor-space to each adult beast.
- (7) Sufficient light and ventilation."

As pendant to this resolution, it was resolved that each local authority ought to have power to refuse to register a dairy-keeper until the authority was satisfied that the premises were in a satisfactory condition, and provided with a sufficient water-supply, adequately protected from pollution.

3. "This Conference is unanimously of opinion that, for the proper preservation of the public health, and especially to prevent the risk of tuberculosis being disseminated through milk, local authorities should be empowered by Parliament to apply in all dairies the tuberculin test to suspected cows, in order to discover whether the said cows suffer from tuberculosis.

4. "This Conference is unanimously of opinion that all private slaughter-houses should be abolished, especially in burghs, and that in each district of a local authority a public abattoir should be established under the supervision of the local authority, and that all animals and their viscera should be, before they are passed out for human food, inspected on behalf of the local authority, and certified fit for human consumption."

SANITARY INSPECTORS' CONJOINT EXAMINATION BOARD.—Twelve candidates, seven of them women, were successful at the examination held in May.

TUBERCULOUS MEAT: A QUESTION OF COMPENSATION.*

THE account of this case, which recently occurred in St. Pancras, is taken from the reports of the Medical Officer of Health of the district (Dr. Sykes). The issues involved are of such importance that we make no apologies for the length of the account given here. As far as possible Dr. Sykes's own language has been used.

On the evening of Friday, April 20th last, I met Inspector Auger at the slaughter-house, No. 89, Leighton Road, and examined the internal organs and the carcass of a young ox that had been slaughtered and dressed.

Cattle reach this slaughter-house direct from the country that do not pass through the cattle markets at Deptford, Islington, or elsewhere. Previous to slaughtering this animal appeared healthy to the inspector and to the manager and his assistants.

After slaughter I found the following conditions :

1. AS TO THE INTERNAL ORGANS.—(a) Both lungs contained numerous large and small tubercular nodules and several abscesses filled with creamy pus, the lungs being very badly diseased. The thoracic lymphatic glands contained numerous tubercular nodules.
- (b) The liver contained numerous tubercular nodules, both large and small, mostly situated in the one half of the liver nearer the circulatory vessels and ducts.
- (c) The pharyngeal lymphatic glands were also affected with pronounced tuberculosis.
- (d) The mesenteric glands were also affected with pronounced tuberculosis.
- (e) The milt, or spleen, presented abnormal patches on the surface.
2. AS TO THE CARCASS.—The carcass appeared well fed and healthy to the naked eye. The cervical glands and glands near the spine, although presenting some mottling, or patchiness, presented no distinct signs of tubercle to the naked eye.

The Royal Commission on tuberculosis recommended in their report of 1898, under the head of Meat, C, Tuberculosis in Animals Intended for Food, paragraph 6, that the following principles should be observed in the inspection of tuberculous carcasses of cattle :

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| <ul style="list-style-type: none"> (a) When the lesions are confined to the lungs and the thoracic lymphatic glands, (b) When the lesions are confined to the liver, (c) When the lesions are confined to the pharyngeal lymphatic glands, (d) When the lesions are confined to any combination of the foregoing, but are collectively small in extent, | <p style="text-align: center;">I.</p> <p>The carcass, if otherwise healthy, shall not be condemned, but every part of it containing tuberculous lesions shall be seized.</p> |
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* The case, which has attained some notoriety in the meat trade as the "St. Pancras Meat Case," will be found described from the trade point of view in *The Meat Trade's Journal* for April 26th, May 3rd, and 10th.

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| <ul style="list-style-type: none"> (a) When there is miliary tuberculosis of both lungs, (b) When tuberculous lesions are present on the pleura and peritoneum, (c) When tuberculous lesions are present in the muscular system, or in the lymphatic glands, embedded in or between the muscles, (d) When tuberculous lesions exist in any part of an emaciated carcass, | <p style="text-align: center;">II.</p> <p>The entire carcass and all the organs may be seized.</p> |
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It will be observed that the lesions in the animal in question were not confined to any one of the separate lesions which would exempt the carcass from condemnation, and therefore it would not be a question of seizing the organs only, but of considering whether the entire carcass should not be seized, inasmuch as, although there was no miliary tuberculosis, there was tuberculosis of both lungs, and, although there was no miliary tubercle on the pleura and peritoneum, the usual form in which it appears on those serous surfaces, there was tuberculosis in both the thoracic (pleural) and abdominal (peritoneal) cavities, reaching such a stage that it would not be long before the serous surfaces were penetrated.

I came to the conclusion that this animal was suffering from general tuberculosis. The absence of any sign of tubercle in the meat was what is only to be expected. It is very rare to find visible tubercular nodules in muscles, because they are not favourable sites or material for the deposition of tubercle, so that it may become visible to the naked eye, whereas the internal organs are favourable sites and substances for the deposition. But tuberculosis when invading most of the internal organs is a constitutional disease, carried by the circulation of the fluids of the body from organ to organ. This is proved by the fact that muscle juice from the meat of tuberculous animals, although the meat may appear sound, may nevertheless prove a source of infection when inoculated in a suitable form into susceptible animals. This has been shown by the experiments of Chauveau, Arloing, Peuch, Galtier, Nocard, Kastner, Kanthack, and others.

It is true that thorough cooking will destroy the infectiveness of meat, but it is also true that the same applies to tuberculous internal organs, and cuts both ways in deciding as to the seizure and destruction or not of a carcass when the internal organs are badly affected.

I came to the conclusion, from a medical point of view, that as most of the internal organs were badly affected with tuberculosis, the whole animal could not fail to be infected, and that the muscles of the carcass would be dangerous as human food, the only protection being one which could not be exerted, as instruction to the purchaser to thoroughly cook the meat would probably render the meat unsaleable and would damage the reputation of the vendor. Hence I decided that both the internal organs and the carcass should be detained in the slaughter-house and the owner, Mr. O'Hara (of Lidstone and Co., Ltd.), communicated with. The reason for communicating with the owner was to give him an opportunity of seeing the internal organs and the carcass, as the animal was apparently healthy while living, and to ascertain whether he would avail himself of the provisions of Sub-section 8 of Section 47 of the Public Health (London) Act, 1891.

On Saturday morning Mr. Coggan, Chairman of Lidstone and Co., Ltd., together with Professors Pritchard and Penberthy, veterinary surgeons, and Mr. Coggan, junr., Assistant-Secretary of Lidstone and

Co., Ltd., and Inspector Auger, met in my office at the Vestry Hall. Mr. Coggan did not ask to avail himself of Sub-section 8 of Section 47 of the Public Health (London) Act, 1891, to treat either the organs or the carcass as trade refuse, and said that he would object to the seizure of the carcass. I frankly told Mr. Coggan and Professors Pritchard and Penberthy that in my opinion the tuberculosis was generalized, and the organs badly affected, and that the Report of the Royal Commission justified the condemnation of the carcass. It was stated that Mr. King, Veterinary Inspector at the Metropolitan Cattle Market, would be consulted. Mr. Coggan asked that no application should be made to a magistrate without giving him the opportunity of appearing, and I promised to inform him of what action would be taken.

I consulted Dr. Bond, Medical Officer of Health, Holborn, in whose district the Meat Market at Smithfield is partly situated, as to the custom at the Smithfield Meat Market. He inspected the organs and carcass in the early afternoon of Saturday, April 21, and the lesions were pointed out to him in the various organs. He agreed that they were affected as I have already reported, and spontaneously remarked that the lungs were "very bad." He could not detect tubercle with the naked eye in the lymphatic glands of the carcass, and stated that under that condition the carcass would not be seized in the London Meat Market, but the internal organs would be destroyed. This evidence as to local trade practice would in all probability have led a magistrate to decide against condemnation, and consequently very costly legal proceedings might have ensued, either upon appeal by the Vestry or upon an action for damages by the owner. I therefore gave instruction that the carcass should be released from the mutually agreed detention.

It was with much regret that, in the face of the customary interpretation placed upon the Royal Commission's conditions, I found myself unable to protect the public against what I believed to be a distinct danger, but in the absence of any provision in the report of the Royal Commission for compensation in such cases as the foregoing, I did not feel that I should be justified in exposing the authority and the public to very costly litigation in a conflict if the position could be improved by any other method.

It is quite clear that there is a great gap between the minimum conditions laid down by the Royal Commission justifying only the seizure of particular organs, and the maximum justifying the seizure of an entire carcass, which gap requires to be filled up. Provision is made for this contingency in the recommendation of the Royal Commission in paragraph 6 before quoted to the following effect: "We recommend that the Local Government Board be empowered to issue instructions from time to time for the guidance of meat inspectors, prescribing the degree of tubercular disease which, in the opinion of the Board, should cause a carcass, or part thereof, to be seized."

A deputation, consisting of Mr. W. Coggan, Chairman to Messrs. Lidstone, Ltd., and the following Directors, namely, Mr. G. W. Grantham, Mr. W. O'Hara, Mr. C. O'Hara, and Mr. S. Blofeld, attended before the Sanitary Committee on the 28th April last.

Mr. Coggan addressed the committee on behalf of the deputation, and stated that the matter had been submitted to the Local Government

Board.* That the deputation was of opinion that no confiscation should take place unless there was compensation. That the carcass seized by the inspector was that of a three-year-old ox, sent from Flixton Hall, Bungay, Suffolk, with a number of cattle to their slaughter-houses to be slaughtered. That Professors Penberthy and Pritchard had been called in, who had examined the carcass, and were of opinion that it was a case of localized tuberculosis, there being no sign of disease in the carcass. That the lungs and bronchial glands, the small lobe of the liver and several of the mesenteric lymphatic glands were affected with tuberculosis, the rest of the organs being sound. That Mr. King, veterinary inspector to the Corporation of the City of London, had also examined the carcass and was of the same opinion. That he had had an interview with the medical officer of health, since which the medical officer of health, with Dr. Bond, had again examined the carcass, and he (Dr. Bond) stated that he should not condemn such a carcass. That the carcass had been released by the medical officer of health, and undertakings had been given that no proceedings would be taken on either side. That if the carcass had been condemned the damages would not have been covered by three figures, Messrs. Lidstone, Ltd., having some eighteen shops. That the Association of Meat Traders had fought the matter on several occasions, and that it had cost the Corporation of Birkenhead some £1,900. That the deputation considered the question of what should and what should not be condemned clearly laid down in the report of the Royal Commission on Tuberculosis. The carcass weighed about 840 pounds.

Mr. Coggan asked that the expenses of Messrs. Lidstone, Ltd., in the matter be paid, and an assurance given that the action taken by the authority would not be repeated, and suggested that similar cases should be referred to a jury of butchers.

With reference to Mr. Coggan's contention that in the opinion of meat-sellers the course to be pursued in cases of tuberculosis should be to cut away the diseased organs and parts, and let the rest be sold, Dr. Sykes remarks "this contention that only the diseased organs or diseased parts should be cut away, translated into practice, can only mean that the organs and parts not saleable should not be sold, and if only unsaleable organs and parts are excluded from sale, it is difficult to understand what is the object of veterinary inspection."

"This last contention throws into relief the opposing views of meat-sellers and their advisers, and meat-eaters and their advisers, in reference to tuberculosis, which may be stated as follows:

"The meat-sellers contend that a slaughtered animal found tuberculous should be seized and condemned organ by organ, and part by part, and the rest sold.

"The meat-eaters contend that as tuberculosis is a constitutional disease the whole animal should be condemned, unless it is proved that the disease is localized, and that even in a case of doubt the benefit should be given to living human beings rather than to dead meat.

"If the former contention is to govern the London market, the public will run serious risks."

* The Local Government Board replied that "It is not the practice of the Board to direct an inspection of a carcass which has been seized under the provisions of the Public Health (London) Act, 1891, and they do not see any sufficient reason for making an exception in the present instance."

The following opinions were obtained by Mr. Coggan:

(1) [Copy.]

"Metropolitan Cattle Market, Islington,
"April 23rd, 1900.

"At the request of Wm. Coggan, Esq., Chairman of Lidstone, Ltd., 20, Bucklersbury, E.C., I examined in the slaughter-house at 89, Leighton Road, Kentish Town, the carcass and viscera of a three-year-old ox. I found the lungs and bronchial glands, the small lobe of the liver, and several of the mesenteric glands slightly affected with tuberculosis, but the rest of the organs sound.

"I made a thorough examination of the carcass, but could find no evidence of the disease therein, the pleura and peritoneum being in a perfectly healthy condition.

"I incised all the superficial lymphatic glands of the carcass, but in none of them could I find any lesions of the disease. The carcass was that of a prime well-fed ox, in my estimation, about 850 lbs., and with the exception of the parts afore-mentioned was, in my opinion, fit for human food, the case being one of localized tuberculosis.

"JAMES KING, M.R.C.V.S.,

"Veterinary Inspector of the Corporation of the City of London."

(2) [Copy.]*

"Royal Veterinary College, N.W.,
"April 20th, 1900.

"DEAR SIR,

"In compliance with your request I have to-day examined at 89, Leighton Road, N.W., the carcass and viscera of a three-year old ox, said to have been condemned by the Sanitary Authority of St. Pancras as unfit for human consumption on account of tuberculosis. I beg to report that I found tuberculous lesions in some of the viscera, but not the slightest evidence of the disease in the carcass, which was in prime condition. There was no evidence of generalization, and I regard the tuberculosis as localized, and the carcass as perfectly fit for human food.

"I am, dear sir,

"Yours faithfully,

"JOHN PENBERTHY.

"To W. Coggan, Esq.,

"Chairman, Lidstone, Ltd."

(3) [Copy.]

"5, Regent's Park Road,
"Gloucester Gate,
"April 20th, 1900.

"I certify that I have this day examined, at the request of Mr. William Coggan, the carcass and viscera of an ox said to have been (?) by the Sanitary Authority unfit for human consumption on account of tuberculosis. I found evidence of the malady in some of the viscera, but not the slightest in any portion of the carcass, which latter, in my

* From *Meat Trade's Gazette*, May 3rd, 1900.

opinion, was in prime condition. I therefore conclude that the disease was absolutely localized, and that the beef should not be condemned.

"WILLIAM PRITCHARD,
"Professor."

Dr. Sykes reported to his committee hereon in the following terms:

"Here it is distinctly stated by veterinary experts that if there are no naked-eye signs of tuberculosis in the carcass the condition of the viscera may be set aside, and that this constitutes 'localized' tuberculosis. From the point of view of the protection of the health of the people this is a very serious attitude.

"The veterinary experts have gravely misused the term 'localized' as it is understood by pathologists, and as it is universally accepted. In the latest work on cattle tuberculosis, by T. M. Legge, M.A., M.D., D.P.H., secretary of the Royal Commission on Tuberculosis, 1896-98, and Harold Sessions, F.R.C.V.S., revised by Mr. King, M.R.C.V.S. (who gave the certificate in question), in Chapter VI., p. 52, appears the following definition of the terms 'localized' and 'generalized':

"In meat inspection the point that is of the utmost importance to decide is whether an animal is affected with localized or generalized tuberculosis. The term 'localized' is used when the disease is limited to one organ, or spreads to another organ by contiguity, or by the lymphatic channels or through the portal circulation (i.e., the circulation between the intestinal tract and the liver), but not by means of the general blood stream of the body. As examples of it are tuberculosis of the retropharyngeal lymphatic glands with tuberculosis of the lungs and bronchial lymphatic glands, tuberculosis of the intestines and mesenteric lymphatic glands, tuberculosis of the lungs and pleura, tuberculosis of the intestines and liver.

"By 'generalized' tuberculosis is meant the spread of the disease by the passage of tubercle bacilli into the main blood stream or into the thoracic duct, and their conveyance thence to different organs and parts of the body, such as the lungs, liver, spleen, kidneys, bones, and muscular tissue. If the bacilli in this case enter in large numbers into the blood stream, then acute miliary tuberculosis (galloping consumption) results; but it by no means follows that in generalized tuberculosis all the organs and tissues become equally infected. Some tissues offer a particular resisting power to the organisms. The lungs are always attacked; then come in order the abdominal organs, the serous membranes, the lymphatic glands of the muscular tissue, the udder, kidneys, and lastly the bones."

"Therefore on Mr. King's own showing it is primarily a question of locality as to whether the disease is 'localized' or 'generalized,' and while Mr. King has certified that the disease was 'localized,' he has described in the same written certificate a dissemination of the disease that proves it to have been 'generalized' according to his own published description—a distinct contradiction, in which he is supported by Professors Penberthy and Pritchard.

"In reference to amount in his certificate, Mr. King says that he found the lungs, etc., 'slightly affected.' Dr. Bond spontaneously remarked after examining them 'The lungs are very bad,' and the owner admitted that he had never seen such a fat carcass with the

organs so much diseased. Mr. King only mentions the small lobe of the liver, but it escaped his observation that an area of the large lobe equal to that of the small lobe was affected, so as to amount to half the bulk, containing numerous large and small nodules radiating from the point of entrance of the bloodvessels.

"Veterinary opinion is, of course, concerned primarily with the question of the health of animals and the protection of agricultural interests, and there is no doubt that it is conscientiously exercised; but the health of human beings and the protection of municipal interests cannot take a secondary place in the welfare of the community. It is doubtful, therefore, whether an opinion or certificate that food is fit for human consumption comes within the province of veterinary surgeons.

"As one side contends that such a case as this does not fall under any one of the heads recommended by the Royal Commission as leading to seizure of organs separately, and as the other side contends that it does not fall under any one of the heads recommended as leading to seizure of the carcass, and as the Local Government Board can fill up the gap left by the Royal Commission, that Board should be approached with a view to amplifying and supplementing the conditions as to the seizure of meat for the protection of the public, especially as to whether the custom of the London Markets is to prevail, namely, that in the case of an animal largely affected with tuberculosis in the thoracic cavity, and considerably affected also in the abdominal cavity, the absence of naked-eye lesions in the carcass specially fed and fattened for the market is to continue to exempt the meat from seizure, and in the case of difference of opinion what course is to be adopted."

When presenting the report on this case to the Vestry, the Health Committee recommended:

That a petition be presented to the Local Government Board urging that the owner of a carcass confiscated, and destroyed wholly or in part by order of a magistrate on account of tuberculosis, should receive full compensation and repayment of the amount paid by him for the animal, provided

1. That the magistrate ordering confiscation shall satisfy himself that the animal had a good appearance before slaughter, was well nourished, and exhibited no visible signs of tuberculosis;
2. That no compensation be paid for any animal for which there has been paid less than a minimum price, to be fixed from time to time by the Board of Agriculture, according to the market values current, nor in excess of a maximum price, to be fixed in the same manner;
3. That no sum shall be paid in compensation except on the order of the magistrate ordering the confiscation of the carcass; and
4. That all compensation so ordered shall be charged against and paid by the Council of the administrative county, which shall be entitled to repayment of one-half of the amount from Imperial funds.

The Vestry adopted the foregoing recommendations, and declined to entertain any claim for expenses (as asked for by Mr. Coggan), or any suggestion as to the formation of a butchers' jury.

REVIEW OF RECENT BACTERIOLOGY.

ENTERIC FEVER WITHOUT INTESTINAL LESIONS. -- Ophüls* records the case of a man, aged twenty-four, who died with enteric fever and in whom no evidence of any intestinal lesion was found post-mortem. The blood during life gave Vidal's reaction with a dilution of 1 : 40, and the urine gave a diazo reaction. At the post-mortem examination the mucous membrane of the intestines appeared to be normal throughout; there were small hemorrhages into the submucous tissue of the stomach and bladder, and enlargement of the lymphatic glands at the root of the mesentery. There were also pulmonary complications. Cultures of the *Bacillus typhosus* and *Bacillus coli communis* were obtained from the spleen.

ENTERIC SEPTICÆMIA. -- Grandmaison† describes two cases of this form of septicæmia, both occurring in pregnant women. In the first case, the woman miscarried in the fifth month of her pregnancy, and came under treatment a few days later with symptoms of peritonitis. On the twentieth day after the miscarriage it was found that the blood gave Vidal's reaction, and from blood drawn from the finger a pure culture of the *Bacillus typhosus* was grown. Death occurred twelve days later, and at the post-mortem examination recently cicatrized ulcers were found on the small intestine, together with evidence of ulcerative endocarditis, pelvic peritonitis, and endometritis. The *Bacillus typhosus* was isolated from the pelvic exudation and from some pus which was present in the uterus. The other case was one of a woman who was admitted into hospital six days after what had apparently been a natural confinement. Some blood drawn from the finger gave Vidal's reaction, but proved sterile on incubation. Four days later a second examination of the blood was made, resulting in the isolation of a culture of the *Bacillus typhosus*. The patient died on the sixteenth day after her confinement, and at the post-mortem examination characteristic ulcers were found in the small intestine. There had also been suppuration in one of the sterno-chondral articulations, and from the pus here cultures of the *Bacillus typhosus* and *Streptococcus pyogenes* were obtained. No "rose spots" were observed during the course of either of these cases, and the clinical diagnosis was uncertain until settled by Vidal's reaction.

THE BACTERIOLOGY OF VACCINE LYMPH. -- Under the somewhat cumbersome name of *Bacillus variabilis lymphæ vaccinalis*, Nakanishi‡ describes an organism which he has found to be almost constantly present in vaccine pustules on man and calves. The bacillus resembles generally the Klebs-Löffler diphtheria bacillus, and even more strongly resembles the so-called pseudo-diphtheria bacillus. It is markedly pleomorphic, and several morphological varieties measuring from $\frac{1}{2}$ to $1\frac{1}{2}$ μ in length and from $\frac{1}{4}$ to $\frac{1}{2}$ μ in breadth are described. The bacillus is decolorized when treated by Gram's method, but stains well with the ordinary aniline dyes. It grows well at blood-heat, and rather less freely as a rule at 22° C.; cultures were grown on Löffler's blood-serum and the ordinary laboratory media. It does not exhibit motility. Nakanishi thinks that Klein's *Bacillus xerosis variole* and *Bacillus*

* The New York Medical Journal, May 12th, 1900.

† Archives de Méd. Expér. et d'Anat. Path., 1^{re} série, tome xii., p. 357, 1900.

‡ Centralblatt f. Bakt. und Parasit., Bd. xxvii., Nos. 18, 19, 1900.

*albus variolæ** are really varieties of the pleomorphic *Bacillus variabilis*.

PYOCYANEUS INFECTION.—Cases of general infection by *Bacillus pyocyaneus* are, if one may judge by recorded cases, extremely rare in man. Probably the first case recorded was that described by Monnier,[†] and another case recorded by Blum[‡] has lately been referred to in these pages. A case similar to the latter is recorded by Lion[§] as having occurred in an adult. The case was that of a woman who died after an illness which had lasted six or seven weeks, and had been diagnosed as acute rheumatic fever with endocarditis. After death vegetations were found on the pulmonary valves, and from these vegetations both *Bacillus pyocyaneus* and some "para-coli" bacteria were isolated; the former bacillus was also isolated from the heart-blood and from the spleen. The tricuspid, mitral, and aortic valves were healthy.

A NEW PATHOGENIC SPOROTHRIX.—Hecktoen^{||} at the Congress of American Physicians (1900) described a new pathogenic fungus. A boy had received a punctured wound of the finger caused by a rusty nail; several nodules appeared around the wound, and later along the forearm and arm. From these nodules as they broke down from time to time cultures of a sporothrix were constantly isolated. The sporothrix appeared in colonies, in each of which spore-bearing threads radiated outwards from a central mass of mycelium. The fungus was fatal when injected into the peritoneal cavity of the rat, and was capable of causing a coagulation necrosis. In the discussion on the paper, Simon Flexner said that the sporothrix when injected into mice caused a general enlargement of the lymphatic glands, which was followed by a septicæmia. Hecktoen, however, said that this was not so in his experiments.

STREPTOCOCCUS PYOGENES IN IMPETIGO CONTAGIOSA.—Gilchrist,[¶] in a paper on the bacteriology of various vesicular and pustular diseases of the skin, gives the results of the examination of seventeen cases of impetigo contagiosa. In every case *Streptococcus pyogenes* was present, in pure culture in ten, associated with *Staphylococcus pyogenes aureus* in the other seven. Whenever mixed cultures were obtained, the streptococcus was at least one hundred times as numerous as the staphylococcus. The streptococcus isolated from these cases was one of very low virulence for mice and rabbits, and in this respect was not to be compared with certain other varieties, such as that obtained from cases of erysipelas.

PNEUMOCOCCIC ARTHRITIS.—Two cases of infection of joints by the pneumococcus have recently been reported at the Société Médicale des Hôpitaux. In the case recorded by Fernet and Lacapère** an osteo-arthritis of the wrist-joint and tenosynovitis of the neighbouring

* Supplement containing the Report of the Medical Officer, 1896-97, Local Government Board.

† *Infection Pyocyaneuse chez l'Homme* (Congrès de Médecine de Bordeaux, 1895).

‡ "Review of Recent Bacteriology," PUBLIC HEALTH, vol. xii., 56 (October, 1899).

§ *Bulletins de la Société Médicale des Hôpitaux de Paris*, 3^e série, May, 1900, p. 556.

|| *Medical Record*, New York, May 12th, 1900.

¶ *Johns Hopkins Hospital Reports*, vol. ix.

** *Bulletins de la Société Médicale des Hôpitaux de Paris*, 3^e série, May, 1900, p. 609.

muscles supervened on an attack of pneumonia. The pneumococcus was isolated from some serous effusion withdrawn from the joint. The other case was recorded by Rendu at the meeting of the society on June 1st, 1900.* In this instance arthritis of the sterno-clavicular and knee-joints appeared after pneumonia. In purulent fluid withdrawn from the sterno-clavicular joint and in serous fluid from the knee-joint the pneumococcus was again identified.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

BEFORE DARLING AND BUCKNILL, JJ.

Thursday, May 30th, 1900.

MASON v. COWDARY.

This was an appeal by case stated from the decision of justices of Bedfordshire dismissing an information under Section 6 of the Sale of Food and Drugs Act, 1875, preferred by the appellant, an inspector under the Act, against Ellen Cowdary, the respondent, charging her with selling, to the prejudice of the appellant, a drug—to wit, camphorated oil—which was not of the nature, substance, and quality of the drug demanded. The question in the case arose under Section 14 of the Act, which provides as follows: "The person purchasing the article with the intention of submitting the same to analysis shall, after the purchase shall have been completed, . . . offer to 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, and shall, if required to do so, proceed accordingly, and shall deliver one of the parts to the seller or his agent." It was proved before the justices that on November 16th, 1899, the appellant purchased from the respondent, who keeps a small general shop, six 2d. bottles of camphorated oil. The oil was exposed for sale in bottles which were not, apparently, prepared by the respondent, but each of them bore a label with the name of a chemist in the neighbouring town of Luton upon it. There was no evidence whether the bottles were identical in character or appearance or whether or not the labels on all the bottles bore the name of the same chemist. The six bottles were all purchased at the same time. The appellant, having notified that he intended to have the oil analyzed, divided the six bottles into three lots of two bottles each, sealing each separate lot of two bottles in a separate bag. He handed one of the sealed bags to the respondent, taking away the other two sealed bags, one of which he subsequently forwarded to the public analyst, who found that the two bottles contained only 17.5 per cent. of camphor, whereas camphorated oil should contain at least 20 per cent. of camphor. The appellant did not open any or either of the bottles of camphorated oil or mix or divide the contents, and the two bottles

* *La Presse Médicale*, June 9th, 1900.

handed to the respondent were in exactly the same state as when purchased. The justices were of opinion that the division of the bottles as described was not in compliance with Section 14, and they were not satisfied that the contents of the two bottles analyzed were identical with the other two lots of bottles in the hands of the appellant and respondent respectively.

Bonsey (for the appellant), contended that the article purchased by the appellant was the six bottles of camphorated oil, and that the method of division which he had adopted was, therefore, in compliance with Section 14. It was the only practical method of division. The bottles contained so small a quantity of oil that the division of one bottle would not have produced a quantity of oil sufficient for the purposes of analysis. Nor would the mixture of several bottles of a drug of this kind into one for the purpose of division be practical, because some of the drugs which would have to be so treated were volatile, and liable to change their character on exposure to the air, and the operation of making a division in this manner would consequently require great care. In the case of seidlitz-powders, which were sold in parcels containing several packets, the method of division adopted had been to divide the parcels into three portions of so many packets each. That was the fairest method of division in that case, and it was also the fairest method in the case of the bottles in question. It was important to obtain a decision as to the proper course to adopt in these cases.

Muir (for the respondent) was not called upon.

DARLING, J., said that what the appellant did was to buy six articles and then to divide those six articles into three. In his opinion each of the bottles purchased was an article within the meaning of Section 14, for it did not matter for the purposes of the Act how small the article was. As the appellant did not divide any one of the bottles into three parts, he did not comply with the provisions of the statute.

BUCKNILL, J., concurred.

Appeal dismissed.

REGINA v. HORROCKS AND ANOTHER, JUSTICES (EX PARTE BOUSTEAD).

In this case cause was shown against a rule for a writ of *certiorari* to bring up and quash an order of two justices of Cumberland. On March 20th last a complaint was made to the justices under section 105 of the Public Health Act, 1875, by Mr. Alfred Hope, that on the premises of Mr. Samuel Boustead at Shield House there existed a nuisance caused by his act or default, and consisting of an accumulation of slaughter-house offal and filth, so as to be a nuisance on the fields at and adjoining Petteril Bank, the residence of Mr. Hope, whereupon the justices made the order now sought to be quashed, the effective portion of which was as follows: "We, in pursuance of the said Act, do order the said Samuel Boustead within one calendar month from the service of this order, or a true copy thereof according to the said Act, to take such steps as may be necessary to abate the said nuisance, so that the same shall no longer be a nuisance or injurious to health as aforesaid, and to pay the sum of 35s. for costs to Mr. David Mans, the solicitor acting for the complainant. And we, being satisfied, notwithstanding the said cause or causes of nuisance may be removed under this order, the same is or are likely to recur, do therefore prohibit the said Samuel Boustead from doing any such acts as may lead

to a recurrence of the said nuisance." The rule was obtained upon the ground that the order was bad in not specifying the works or things required to be done in order to abate the nuisance as required by Section 96 of the Public Health Act, 1875, as interpreted in *Reg. v. Wheatley* (16 Q.B.D., 34). Section 96 of the Public Health Act, 1875, provides that, upon default being made by a person upon whom a notice to abate a nuisance has been served and upon complaint made by the local authority to the justices, such justices "shall make an order on such person requiring him to comply with all or any of the requisitions of the notice, or otherwise to abate the nuisance within a time specified in the order, and to do any works necessary for that purpose; or an order prohibiting the recurrence of the nuisance, and directing the execution of any works necessary to prevent the recurrence; or an order both requiring abatement and prohibiting the recurrence of the nuisance." Section 105 provides that complaints may be made by any person aggrieved by a nuisance, and "thereupon the like proceedings shall be had with the like incidents and consequences as to making orders" and otherwise, as in the case of complaint made by the local authority.

Sanderson, L., in showing cause, contended that where the proceedings were taken by a private individual *Reg. v. Wheatley* did not apply, and that there was no necessity for the order to specify the works or things required to be done to abate the nuisance. In the present case no works within the meaning of the Act were required (see *Millard v. Westall*, 1898, 1 Q.B., 342). It would have been quite sufficient if the justices had simply ordered Mr. Boustead to abate the nuisance. Even if the first part of the order was bad, the second part, prohibiting the recurrence of the nuisance, was good (see *Mayor, etc., of Scarborough v. Rural Sanitary Authority of Scarborough*, 1 Exch. D., 344).

Macaskie, in support of the rule, relied on *Reg. v. Wheatley*, arguing that the person against whom such an order as this was made was entitled to know what were the steps the justices thought necessary to be taken by him to abate the nuisance. In the present case it might have been sufficient to cover the offal with earth, or it might have been necessary to remove it altogether.

DARLING, J., said that he did not agree with Mr. Sanderson's contention that different principles applied when the complainant was a private individual to those which applied when the local authority were the complainants. In his opinion, the orders were to be made with the same particularity in each case. The order in this case did not follow the statute. It only said that Mr. Boustead must take steps to abate the nuisance, and did not specify the things or works which he was to do in order to abate it. That put him in a difficulty. He would not know what the justices intended him to do, and having done what he himself thought to be sufficient to abate the nuisance, he would nevertheless be again liable to be proceeded against. The part of the order, therefore, which dealt with the abatement of the nuisance was bad, but the part dealing with the prohibition of a recurrence of the nuisance was good, for in preventing the recurrence of the nuisance there was no need to do any works at all. The prohibition in this case simply amounted to saying, "Don't again accumulate offal or filth on this land."

BUCKNILL, J., concurred.

Rule made absolute as to abatement, discharged as to prohibition.

REVIEWS.

TWENTY-EIGHTH ANNUAL REPORT OF THE LOCAL GOVERNMENT BOARD, 1898-99. Supplement containing the Report of the Medical Officer. Pp. xlviii. and 588; 33 plates, maps, etc. London: Eyre and Spottiswoode. 1899. Price 7s. 4d.

This posthumous Report by the late Sir Richard Thorne-Thorne, K.C.B., is a volume exceeding in bulk as well as in administrative and scientific interest its twenty-seven predecessors.

The Local Government Board is, like all Government departments, the butt of endless criticism—in the main good-humoured, and more often than not irresponsible—yet we venture to think that the record of accomplished work contained in the volume under review will suffice to repulse the attacks of even a determined critic; and, to paraphrase the words of an old Sunday-school poem, “Those that come to scoff” will “remain to praise.”

I. *Vaccination*.—This part of the Report deals with the year 1896, when 914,205 children were born. In that year were noted “the highest percentages of default under the Vaccination Acts that are on record,” the proportions of children “not finally accounted for” amounting to 22.9 per cent. in England and Wales, 26.4 in the Metropolis, and 22.3 in the rest of the kingdom. The percentage of children successfully vaccinated was 66, or 602,922 in actual numbers. Although no single case of insusceptibility was met with in 1896 among the 3,548 primary vaccinations performed by the Board’s operators, giving a total of 110,728 consecutive primary vaccinations without a single failure under the Board’s auspices, as many as 2,885 children were certified by public vaccinators and private practitioners as insusceptible—“that is, had been vaccinated unsuccessfully at least three times.”

In describing the arrangements made under the new system of lymph-supply, a very interesting record is made of a calf the lymph from which had been rejected by reason of the calf being found on post-mortem examination to present some tubercular lesions. “The most careful investigation of the lymph failed to reveal in it any evidence whatever of the tubercle bacillus.”

II. *Administrative Work*.—Probably the most interesting of the reports by the medical inspectors of the Board are those dealing with conditions prevailing at Camborne, in Cornwall, and Aldeburgh-on-Sea, where the public were at the mercy of private water companies, the local authority in each case being powerless. At Camborne the result was enteric fever, where 165 cases, with 12 deaths, occurred, all but two of the cases being “associated with the habitual use of the Camborne Company’s water.” The gathering-ground was found on inspection to present ample “opportunity for becoming fouled with human and other filth. . . . In one of the houses standing on it (the watershed) . . . four cases of enteric fever occurred during October and November. A pond near by served as the receptacle for all the fluid dejecta of the sick, and for the washings of linen, etc., whilst the ground around was found by Dr. Low to be profusely littered with solid human excreta. . . . On heavy rainfall this pond overflows and runs down a steep hillside to the brook which augments the company’s supply.”

At Aldeburgh-on-Sea the “gathering-ground, co-terminous with a particular geological formation of high porosity, is a much-polluted subsoil contaminated by filth-products from cesspools, cesspit-privies,

fold-yards, manured fields, manure-heaps, pigsties, and the like. . . . It may indeed be suspected that the Aldeburgh inhabitants are, in a manner and on occasion, forced into drinking their own diluted sewage.” Instances were given to the inspector where centipedes and other low forms of animal life had been delivered through the tap with the water. The inhabitants complained that “the water, especially when heated, gave forth a distinct odour of sewage. This odour had at times proved so nauseating that people stated to me that they had abandoned the practice of washing in warm water or taking hot baths!” Certain opinions, based on the chemical analysis *alone* of this water, emphasize the often under-rated difficulty of properly interpreting the results of such analysis in the absence of a knowledge of the source and surroundings of the water-supply.

The advocates of water-carriage as opposed to conservancy methods will find another text for their sermons in the report upon the persistence of enteric fever in the Swinton and Pendlebury Urban District, in which district, taking the deaths from those diseases which most nearly represent enteric fever, the rate is two and a half times greater than that which prevails in England and Wales, and in recent times and over a period of years it is more than double that for the great towns. Dr. Thomson refers this persistence of enteric fever principally to the fact that “the place abounded in nuisances, mainly arising from the offensive midden-privies . . . which lead to persistent fouling of the soil in the neighbourhood of dwellings.”

An epidemic of measles at Burton-on-Trent was made the subject of inquiry by Dr. Theodore Thomson, and the opinion expressed by him as the result of investigations upon the same subject a few years ago has received complete confirmation in the case under review. Briefly, Dr. Thomson’s conclusions are, that to control a measles epidemic every known precautionary and preventive measure to that end must be put into operation: “If any approach to complete success be arrived at, each one of the several measures indicated must be regarded as necessary and supplementary to the others.” Naturally these measures, if efficiently and fully carried out, mean the spending of much money, but inasmuch as “close upon 13,000 lives are annually sacrificed to this one disease in England and Wales, and that coincidentally with the increasing aggregation of children in elementary schools the tendency of this mortality is to increase rather than to decrease,” surely the ratepayer should not grumble at the small addition to his burden which would be involved by the proper control of the disease. The national sacrifice of young children is heavy enough already, and the future of the British Empire depends largely upon questions of this kind.

III. *Prevention of Plague*.—The questions of plague precautions at home, and of the diffusion of the disease in foreign countries having commercial and other communication with England have both received careful study, and are fully reported. An important axiom in epidemiology has found ample confirmation in this study, viz., that epidemics may very frequently be found to be preceded by the insidious prevalence and persistence of a mild and apparently simple illness, similar in some of its symptoms to the more serious type, which grows *pari passu* in prevalence and virulence. Thus we have pre-epidemic “diarrhoea” followed by epidemic enteric fever or cholera, simple “sore throats” or

* *Vide* also Twenty-Fourth Annual Report Local Government Board, 1896. Medical Officer’s Supplement.

"mumps" followed by diphtheria, and now "fever with glandular swellings" (*Pestis minor* or *Pestis ambulans*) followed by deadly Oriental plague.

For the first time in the history of the Indian Empire the Government prohibited the embarkation of any person resident temporarily or permanently in the Bombay Presidency or Sind with the object of making the annual pilgrimage to Mecca. This prohibition resulted in a stoppage of the pilgrimage.

IV. *Auxiliary Scientific Investigations.*—To a large extent these form a continuation of the investigations reported upon in the volume issued last year. Dr. Klein has added to our knowledge of the *B. enteritidis sporogenes* (the biology and morphology of which were described in the last Report) some interesting relations between this bacillus and the diarrhoea associated with enteric fever, the cases investigated being taken just as they came into the wards of St. Bartholomew's Hospital. It was found that in the typical fluid stools of enteric fever the spores of this bacillus were, as a rule, numerous present, whereas in 39 per cent. of the cases with formed stools the spores were altogether absent. Dr. Klein further found that this microbe was an inhabitant of the human intestine in health as well as in disease, though only in small numbers, and the conclusion appears to be that it is an interaction between the two microbes (*B. enteritidis* and *B. typhosus*), which results in a typical attack of enteric fever with "pea-soup" diarrhoea.

Dr. Klein, as the result of a series of experiments on the buried cadaver, finds that it is disintegrated practically by the sole efforts of an anaerobic bacterium which he proposes to name *B. cadaveris sporogenes*, and which he has satisfied himself is present in all buried bodies. The presence of this bacillus under certain experimental conditions of burial is inimical to the majority of pathogenic microbes (*B. typhosus*, *Vibrio cholerae*, *B. diphtheriae*, *B. pestis*, *B. tuberculosis*, etc.), no one of weeks, a month being usually sufficient for its extinction. This would be long before any ordinary coffin would have decayed to such an extent as to permit of leakage. This is in accord with the findings of many bacteriologists, who have failed, in spite of unfavourable chemical reports, to demonstrate specific pathogenic micro-organisms in the drainage-water of graveyards, though the presence of other bacteria was easily detected.

The soil has of late come to be regarded as a factor of the highest importance in the aetiology of such diseases as enteric fever, and Drs. Martin and Houston have continued their researches into its influence upon the viability of the *B. typhosus*. Dr. Martin finds that although this bacillus can persist for many months in *sterilized* soil, "in no single instance did it survive beyond twenty-four hours" when brought into competition with the bacterial life natural to the soil. Certain micro-organisms normally present in the soils examined quickly exerted an inhibitory influence upon the *B. typhosus*, whilst, on the other hand, the pathogenic microbe suppressed a few, but only a few, of the others. Dr. Houston's experiments will, however, be of more practical interest inasmuch as he observed the viability of the cholera vibrio when sown in large quantities over a considerable area of natural soil in the open country (the area measuring 16 feet by 15 feet, and being situated on a gentleman's estate a few miles outside London). The control microbe (*B. prodigiosus*) was recoverable from the soil after several months, whereas Koch's vibrio could only be recovered with

difficulty after a few days, though when supplied with pabulum in the shape of liquid horse manure it did not die out quite so quickly. Dr. Houston is very careful to explain that his conclusions apply only to the particular soil, seasons of the year, climate, etc., under which the tests were made. Moreover, there is some probability that the vibrio changes morphologically during a sojourn in soil (where the conditions were not perhaps altogether favourable to it) in such a manner as to render its recognition difficult.

Dr. Houston has further continued his examination of soil washings with a view to throwing some light on the pollution of reservoirs and rivers by flood water. The greatest stress is laid upon the importance of ascertaining not merely the presence but also the *relative abundance* of particular germs in water, soil, and air. A particular microbe may be present in air, earth, and water, yet only be a natural inhabitant of one of these, being present in the other two in small relative numbers, and merely as an occasional visitor. As points of the first importance in the bacterioscopic examination of a water-supply Dr. Houston mentions the number of bacteria present in spore form, and the ratio between the number of spores and the total number of bacteria inclusive of spores. Any sudden variation in either of these two things may be taken as evidence of the access of flood-water or the overtaxing of filter-beds. Dr. Houston's parallel chemical and bacteriological examinations of water tend to show what several water epidemics have already forcibly pointed out, namely, how little reliance can be placed upon chemistry alone as an indication of "purity and safety." He finds from his work that "soil other than recently and grossly-polluted soil is not likely to yield to water *B. coli* in any large number." Streptococci of different varieties were isolated from three soils which were grossly polluted, but could not be isolated from ten specimens of pure or moderately pure soils, their presence in a water-supply being thus suggestive of recent and grave pollution.

A point of the most puzzling and serious nature is likely to be cleared up by the researches of Dr. Mervyn Gordon, who has examined bacteriologically the discharges from the noses and ears and the secretions of the throats in cases of scarlet fever with a view to determining the rôle to be severally attached to these as infective agents. Ear-discharges in all of twelve cases examined, several times over and at different stages of illness, failed to show the presence of the *Streptococcus scarlatine*. Similarly twelve cases of nasal discharge gave practically negative results. But on making twenty-seven examinations of the throat secretions of eighteen convalescents, no less than twenty positive results were obtained. Not only that, but thirteen of the positive results were obtained from eighteen cases at late stages of the illness—after the beginning of the fifth week, and in some cases in the eighth and ninth weeks. The streptococcus isolated was tested as to virulence by inoculation into mice, with a fatal result in eight out of ten cases, the two survivors being ill for some time. It will be interesting to have the conclusion indicated by the above experiments tested in the actual practice of fever hospitals.

The Report deals with other matters of deep importance and interest, upon which, however, the space at our disposal does not permit comment. We would especially commend the painstaking and scientific work of Drs. Monckton Copeman and Gustav Mann on the histology of vaccinia, the report upon which is illustrated by a series of really excellent plates. Of the report as a whole the best compliment that

can be paid to it is that it is undoubtedly fit to rank with its illustrious predecessors as a record of some of England's great contributions to the science of hygiene.

LECTURES ON SOME OF THE PHYSICAL PROPERTIES OF THE SOIL.
By Robert Warington, M.A., F.S.A. Oxford: The Clarendon Press, 1899. Pp. 231. Price 6s.

This most excellent little book, on a much-neglected subject, formed the substance of a course of lectures delivered by its author when Sibthorpian Professor of Rural Economy at Oxford. Although primarily written for the scientific agriculturist, it will be of great assistance to every medical officer of health desiring to make himself familiar with certain of those physical properties of the soil which have powerful influences on the public health.

It is a reproach to our best text-books on "Public Health" that such as deal with soils and their examination do so in an unsatisfactory manner. In none of them is given an accurate description of the physical properties of soil, without which it is impossible for the student to appreciate its importance; and none contain descriptions of methods of examination which are in any way sufficient to enable an adequate examination to be made.

Those who desire to know what has already been done in the examination of the soil must consult scattered papers in German and American journals dealing mainly with agriculture or meteorology.

There are many questions which arise in dealing with such subjects as water supplies, sites for dwellings, sewage disposal, seasonal diseases, and a host of others, which require for their proper understanding a good knowledge of the physical properties of soils. This book deals with many of the most important of these properties in a lucid, concise, and altogether most fascinating manner.

The fact that the whole work has been conceived and written for the agricultural student does not in any way detract from its value to the student of sanitary science. Its only fault is that it does not go far enough; but this may soon be remedied, for the author promises in the preface that if the present volume meets with a favourable reception it is his intention to publish a continuation, dealing with the chemistry of soil. There is probably nobody more competent to deal with the chemistry of the soil than Professor Warington, and we hope that the present volume will be so well received that the second part may not be long delayed. To complete this work it will be necessary to deal with the biology of the soil, and there again the task could not be put in more able hands. The present volume is strictly confined to certain of the physical properties of the soil, such as the physical constitution of the soil, the relations of soil to water, the relations of soil to heat, and the movements of salts in the soil.

The book is one which every student of public health should possess, and the study of it will stimulate many to further investigations along similar lines.

INSTRUCTIONS FOR THE PREVENTION OF MALARIAL FEVERS. Liverpool School of Tropical Medicine.

These instructions form a pamphlet of fourteen pages, and although written for the use of residents in malarious places, they may be perused by others with advantage, especially medical men interested in preventive medicine. The work deals with malaria and its prevention wholly from the point of view of the mosquito being the causal agent.

A clear and concise description is first given of the nature of malaria, the dependence of the disease on the growth and reproduction of the hæmamoebidæ, and the destructive action of quinine on these parasites. A paragraph is then devoted to the explanation of the life-history of parasites in general, and the manner in which they are transferred from an infected to a healthy host. In the case of malaria, the parasite in the blood of the infected person is sucked into the stomach of the anopheles mosquito, whence, burrowing into the body-tissue, it develops and grows into maturity, and finally produces a swarm of young, which enter the poison or salivary gland of the insect. From the gland the young are injected into the blood of a healthy person through the wound made by the proboscis of the mosquito when the insect bites. The fact is thus emphasized that malaria is a disease communicable from the sick to the healthy by the agency of the mosquito of the anopheles species. The life-history of the mosquito is described, and the differential characters of the anopheles which, when infected, carry the malarial parasite, and those of the culex, which does not carry the parasite, are given. The larvæ of culex are to be found in artificial collections of water, such as tubs, pots, broken bottles, cisterns, and drains; while those of anopheles prefer natural collections of water—puddles which do not dry up quickly, contain no fish, and are not liable to be scoured out by heavy rain. In fact, their favourite breeding-places are stagnant puddles of water in low-lying flat localities, especially where the ground tends to be marshy, and in places where the ground has been excavated, embanked, or trenched. The draining away of the breeding-pools of anopheles removes the malaria. The anopheles can easily be distinguished from the culex. "Anopheles have a slim, elegant body, shaped like that of a humming-bird moth, a small head, and a long, thick proboscis. When seated on a wall, the axis of the body is almost at right angles to the wall, and they generally have spotted wings. Culex have a coarser body, with a thick thorax or chest, and a thin proboscis. When seated on a wall, the tail hangs downwards, or even a little towards the wall, and the wings are generally quite plain."

To prevent infection with malaria, it is requisite to take measures to avoid being bitten by mosquitoes, and to kill mosquitoes or their larvæ, especially anopheles, or prevent them from breeding round the house. To avoid being bitten, mosquito-nets are used during the night, and punkahs during the day. Mosquitoes can be destroyed by emptying out all pots and vessels containing stagnant water, and brushing out with a broom all puddles containing larvæ. Larger collections of water require to be filled up or drained. If this cannot be done, then recourse must be had to the habitual use of culicides, of which the chief is oil, applied to the surface of the water. The pamphlet is written in simple language, is devoid of technical terms, which permits of it being easily understood by laymen, and is full of practical measures calculated to render a house in the tropics free of malaria.

BUBONIC PLAGUE: ITS COURSE AND SYMPTOMS, AND MEANS OF PREVENTION AND TREATMENT. By Dr. José Verdes Montenegro, Professor at the Municipal Micrographical Laboratory, Madrid. Translated by W. Munro, M.D., late District Medical Officer of St. Kitts, W.I. London: Baillière, Tindall, and Cox. Crown 8vo., 84 pp. Price 3s. 6d.

Professor Montenegro has succeeded in giving an excellent and interesting résumé of the important work that has been done during recent

years to discover the causes of the propagation of plague, and how to combat its attack. He divides the subject into sections dealing with the biological character of the plague bacillus, the mode in which the infection is manifested, the vehicles which convey the contagion, the mechanism of diffusion of the plague, prophylaxis, sanitary measures, the clinical aspects and treatment of the disease, sero therapeutics, and concludes with a description of the plague in Oporto. He reserves the greater part of the small volume to a relation of the main facts ascertained by investigation and research in China, India, and Oporto, and passes over as of little practical interest many of the theoretical considerations which have been raised from time to time.

Commencing with the biological characters, the first chapter is devoted to an account of the plague bacillus, its form, size, cultural appearances, and behaviour when exposed to different conditions. The action of external influences is summed up in the statement that a temperature of 100° C., or chemical disinfectants, especially the acids, such as carbolic acid, destroy the bacillus in a very short time; but that drying and exposure to the sun are by no means certain in their action on the vitality of the bacillus. Drying and exposure to sunlight have often a destructive effect. Still, some cultivations exposed to the influence of light and air in the Pasteur Institute have shown virulence after three and a half months, and have killed a guinea-pig in a little longer time than is required by cultivations of normal strength. The vitality and virulence of the microbe depend on conditions by no means thoroughly understood, and in this respect plague is in the same position as many other of the infectious diseases.

As regards the mode in which the infection is manifested, it appears that, as far as information is available, there is no part of the body which may not be infected, though all parts do not offer the same aptitude for infection. If classified according to the greater or lesser facility and frequency of contagion, the order may be set down as the skin, the nasal, ocular, buccal, intestinal, rectal, and vaginal mucous membranes. There is no possible doubt as to the infection through the skin, but it is still open to question as to whether the microbe can penetrate the healthy skin, experimental proof being still very meagre in this respect. It is very unusual to discover any visible sign of scratches or wounds on the skin which indicate the point of entrance of the bacillus. Experiments on monkeys have shown that a slight puncture on the palm of the hand with the point of a needle is sufficient to produce the disease, without leaving any trace of the puncture or any lymphangitis. As regards the mode of infection through the respiratory organs, it is pointed out that the nasal mucus seems to offer an extremely favourable medium for the cultivation of the plague bacillus, and that it is a question yet to be decided whether the broncho-pneumonia of plague is due to the inspiration of this infecting material, or to propagation of the nasal inflammation by continuity to the respiratory tubes. Probably it arises in both ways.

Passing on to the vehicles which convey the contagion, the subject is considered under the headings of transmission by animals, transmission from man to man, transmission through the air, and transmission by objects. The rat takes an important part in the dissemination of the disease, and instances are given in support of the view that plague is transmitted from the rat to man. After citing these, Professor Montenegro rightly remarks that the facts are not sufficient to explain the contagiousness of a disease which claims thousands of

victims. Simond's ingenious experiments with rats and fleas are mentioned with approval. The contagion from man to man is not of much importance. Physicians and nurses very rarely fall victims to the disease, nor is there experimental evidence to show that there is infection of the air which surrounds a plague-stricken patient. Clothing, textile fabrics of various kinds, and dirty objects seem to act as much more important vehicles.

The prophylaxis of plague is divided into the protection of the individual, and local defence. The first relates to personal hygiene, which largely consists in the use of soap and water to secure cleanliness, the second relates to general hygiene. In this connection Dr. Montenegro makes some sensible remarks as to the importance of distinguishing between essential and subsidiary precautions. "Every epidemic has its special mechanism of diffusion, and we must decide, in the first place, to use means to destroy this mechanism. Typhoid fever is spread by water. When an epidemic breaks out, all the money and energy which is employed in the sanitation of districts, disinfecting houses, preventing overcrowding, etc., will not check the spread of the disease as long as the water-pipes continue to distribute sickness and death to each house. On the other hand, the stopping of the contaminated supply is sufficient at once to put a stop to the spread of the fever." Equally happy are Dr. Montenegro's views with regard to quarantine and sanitary cordons. They are as advanced as any which have been advocated in England, and are well worthy of perusal.

The clinical aspects of the disease, its lesions, and treatment are shortly given. The sero-therapy of plague is then dealt with, and some remarks on the plague at Oporto bring an interesting volume to a close.

APPOINTMENTS.

- Atkins, S. E., *L.R.C.S.*, appointed M.O.H. of North Lew Rural Sanitary District.
 Boake, S., *L.R.C.P.*, appointed M.O.H. of Chard Rural Sanitary District.
 Borthwick, T., *M.D.*, appointed M.O.H. of Adelaide.
 Carr, M., *L.R.C.P.*, appointed M.O.H. of Shire of Woorayl, Victoria.
 Cartwright, J. A. T., *M.R.C.S.*, reappointed M.O.H. of Wignmore Rural Sanitary District.
 Courtenay, K. J., *L.R.C.P.*, appointed M.O.H. of Wareham and Purbeck Rural Sanitary District.
 Eadon, S. B., *M.D.*, appointed M.O.H. of Shire of Karkaroo, Victoria.
 Elliott, F. S., *M.R.C.S.*, appointed M.O.H. of Donnybrook Local Board of Health, West Australia.
 Gimson, K. C., *M.B.*, appointed M.O.H. (*pro tem.*) of Witham Urban Sanitary District.
 Griffith, A., *M.D.*, appointed M.O.H. of Hove Urban Sanitary District.
 Hepworth, A. F., *M.A., L.R.C.P.*, appointed M.O.H. of Shire of Tungamah, Victoria.
 Jones, C. W., *M.B.*, appointed M.O.H. of Hale Urban Sanitary District.
 Kelly, C., reappointed M.O.H. of West Sussex Combined Sanitary Districts.

- King, J., *L.R.C.P.*, appointed M.O.H. of Bude and Stratton Urban Sanitary District.
- Liddle, P. H., *M.B.*, appointed M.O.H. of Western Riding of Warranga, Victoria.
- Mackay, J. D., *M.B.*, reappointed M.O.H. of Knaresborough Urban Sanitary District.
- Maidlow, W. W., *M.D.*, appointed M.O.H. of Ilminster (Somerset) Urban Sanitary District.
- Mitchell, A. M., *M.D.*, appointed M.O.H. of Guildford Urban Sanitary District.
- Paget, O., *M.B.*, appointed M.O.H. of North Fremantle Local Board of Health, West Australia.
- Ramsay, D. E., *M.B.*, appointed M.O.H. of Lennonville and Mount Magnet Local Boards of Health, West Australia.
- Ritchie, R. H., *M.B.*, appointed M.O.H. of Shire of Arapiles, Victoria.
- Sangster, J. I., *M.R.C.S.*, appointed M.O.H. of Kooronga, South Australia.
- Sharp, H. C., *M.B.*, appointed M.O.H. of Truro Urban Sanitary District.
- Thwaites, J. S., *M.B.*, appointed M.O.H. of United Shire of Newham, Victoria.
- Unsworth, J. W., *M.B.*, appointed M.O.H. of Blackrod Urban Sanitary District.
- Wales, T. G., *M.R.C.S.*, reappointed M.O.H. of Downham Market Urban Sanitary District.
- Wilson, J. M., *M.D.*, appointed M.O.H. of Wheatley Urban Sanitary District.

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EDITORIALS.

INFECTIOUS DISEASE ISOLATION.

IN our February issue* we drew attention to the difficulty which the Local Government Board for Scotland was encountering in its endeavour to get the local sanitary authorities into line. One authority in particular considered the sanitary inspector the best judge of the sufficiency of isolation of fever cases. Correspondence on the subject has been going on until quite recently, and now it appears that a compromise has been arrived at. A bye-law has been approved to the effect that no case of infectious disease is to be sent to hospital at the cost of the local authority without an order signed by the medical officer of health, and approved by the local authority, or a committee of that body.

The only explanation of the Board's concession must be that eventually the public will find the delay so vexatious that they will insist on the cause of it being removed, and one can only hope that the delay which must result may not lead to a public scandal through the death of a patient. Probably, also, the members of the committee will soon find the demand upon their time more than they bargained for, especially on Sundays and during times of epidemics.

Doubtless the Local Government Board anticipate some such result, for they write:

"At the same time, I am to say that the Board are satisfied that any material loss which the local authority may have suffered through excess of zeal on the part of their medical officer in the isolation of disease, or which they could possibly suffer through the adoption of the draft regulations as they stand, is inappreciable as compared with the loss which the regulations as modified may entail through the spread of infection in the precious first hours after notification.

Infectious diseases must, in the interests of public health, be promptly removed by night or by day, on Sunday or Saturday. The interests of the individual may be prejudiced by delay in certain cases even more than those of the community. The Board are advised that in the case of diphtheria every hour lost before the application of the serum treatment diminishes the chance of success. This being so, the removal of diphtheria to hospital ought to be entirely untrammelled by routine, and the circumstances which justify removal at the cost of the local authority demand the most liberal construction. In short, the Board recognise in the proposed method of executing Section 54 of the Public Health Act at all times some public disadvantage, and foresee circumstances in which the public safety will require continuous session of the local authority or their committee."

LIABILITIES OF LOCAL AUTHORITIES FOR NEGLECT OF OFFICERS.

THE case of *Thompson v. The Vestry of the Parish of Camberwell*, which was heard by Mr. Justice Darling and a jury in the Queen's Bench Division of the High Court of Justice on June 30th, involved an important question with regard to the liabilities of sanitary authorities for negligence in not only constructing but also in not maintaining sewers vested in them. The facts appear from the report in another column.* The point which seems to have weighed with the learned Judge was that there was evidence of failure on the part of the officers of the Vestry to attend to the complaint made to them by the plaintiff, and that their contention that they did not know, and could not by the exercise of any reasonable care have known, of the alleged defect was by the evidence negatived, and that the evidence disclosed clear proof of negligence.

The point is of great importance, and shows the absolute necessity of proper records of complaints being kept, and of their being promptly dealt with.

The rights and liabilities of local authorities on questions connected with sewerage are not the same as in matters relating to highways. In respect of the latter, they are held not liable for acts of omission but only of commission, while in matters relating to sewerage and drainage, from the case in question, it is clear that local authorities are liable for omission to discharge their duty.

HOWARD MEDAL.—The Royal Statistical Society announces that the next competition for the Howard Medal (1900-1901) will take place in the ensuing session. The essays must be sent in on or before June 30th, 1901. In addition to the medal, a grant of £20 will be awarded to the writer who may be the successful competitor. The subject is: "The History and Statistics of Tropical Diseases, with especial reference to Bubonic Plague." Full information can be obtained from the secretary of the society at the office, 4, Adelphi Street, Strand, W.C.

* See p. 828 of this issue.

THE BEST MEANS OF HOUSING COWS IN COUNTRY AND URBAN DISTRICTS.*

By JOHN SPEIR, Esq.,
Of Newton Farm, near Glasgow.

In bringing this subject before you I do so entirely as a farmer or owner of stock, not as an architect. The subject of the construction and ventilation of byres, more especially the details on which are dependent the comfort, cleanliness, health, and attention to the cows, has engaged my attention for many years. It is only at very wide intervals that farm steadings are totally reconstructed, so that even where sufficient skill exists it is often very difficult to get such carried out efficiently.

Few of those who design byres are fully conversant with farm life, the wants of the animals of the farm, and the arrangements necessary for attendants to look properly after them. The factor, where he has the experience necessary to carry out such effectively, is often hampered for the means to do so; the city architect, through inexperience, adopts a design pleasing to his tastes, but often very defective and inconvenient in practice; while the farmer has usually taken the buildings as he found them, and has seldom made a special study of them. The consequence is that few byres are constructed on the most approved design to save labour, and secure the health and cleanliness of the cows.

While my remarks have reference principally to the class of buildings in which cows can be housed in the best health and comfort during winter, I have prominently kept in view the conditions under which milk may be produced most likely to be free from dirt or disease. I have also kept in view the conditions under which the stockowner may conduct his operations with the least expenditure of labour, and the greatest comfort to himself and servants, with the minimum of cost to the landlord. The county and municipal authorities of Scotland have shown much greater interest in this matter than similar bodies in England or Ireland. Encouraged by the good work which has been done in our army barracks, navy, merchant service, and lodging-houses in reducing tubercular disease by giving increased cubic space, they have principally confined their attention to it. Even on that point, however, scarcely two of them hold similar views, as is shown by the following table, giving the regulations in force in each county and burgh in Scotland in regard to cubic air-space:

* Read at the Conference on Tuberculosis convened at Glasgow, April, 1900.

Regulations re Cubic Air-space per Cow demanded by the Burghs of Scotland.

Name of the Burgh.	CUBIC SPACE IN FEET.		Notes.	Date when issued.
	New Byres.	Old Byres.		
Aberdeen...	800	700	None. { Single stall, 4 ft. } { Double stall, 7 ft. }	1/11/97
Dornoch ...	—	—		
Dundee ...	800	800		1/8/98
Edinburgh	800	800	Stalls, etc., 14 x 4 = 56 ft., new. { „ old, 3 x 11 = 33 ft. } height } 11 ft. } { „ new, 4 x 11 = 44 ft. }	28/5/98
Greenock...	500	500		28/5/88
Inverness	800	800		21/1/95
Kilmarnock	500	400		1/3/89
Paisley ...	800	500		1/8/87
Perth ...	600	400		1/8/90
Wick ...	600	400		1/2/96

Regulations re Cubic Air-space per Cow demanded by the County Councils of Scotland.

Name of the County.	CUBIC SPACE IN FEET.		Notes.	Date when issued.
	New Byres.	Old Byres.		
Argyll ...	700	500	Mid district. Northern. 400 in very exposed sites.	1/9/93
Ayrshire ...	450	375		1/8/92
Banff ...	600	450		11/11/96
Berwick ...	500	500	Floor space, 7 ft. (3½ x 12).	1/6/93
Dumbarton	500	400		28/5/92
Elgin ...	400	400		15/5/95
Fife ...	600	500	None. Stalls, 3½ ft.	29/9/96
Forfar ...	650	500		1/1/99
Haddington	—	—		
Kincardine	600	600	None.	5/6/93
Lanark ...	500	400		1/7/92
Linlithgow	—	—		
Midlothian	400	400	Floor space, 42 ft.	15/9/94
Peebles ...	600	450		28/11/92
Perth ...	500	500		
Renfrew ...	500	400	None. { Single stall, 7 x 4 ft. } { Double stall, 7 x 6 ft. }	1/12/91
Ross... ..	350	350		0/12/92
Roxburgh	800	420		0/5/94
Stirling ...	600	450		28/5/92
Sutherland	—	—		
Wigtown ...	500	500		15/4/96

In supervising new buildings or alterations on old ones, county and municipal authorities should proceed against the owner and not the occupier, and confine their attention to the latter to the proper cleanliness of the buildings let to him. This Conference might also attempt to get County and Municipal Councils to adopt certain general principles, leaving each to carry out the details in its own way.

In the housing of cows, the first and main point is to make the conditions of life under which our cows pass the winter as natural as possible. The moment we break any of Nature's laws there is sure to be some breakdown, and in none do we offend oftener than in regard to fresh air, the most plentiful commodity the world contains. During 1893 and 1894 a very extended series of tests was made by me on the air of byres, horse stables, dwelling houses, schools, etc., under various conditions of season, temperature, weather, etc., as fully detailed in Vol. ix., Part I., of the *Journal of the British Dairy Farmers' Association*. These tests, together with others which have from time to time been made public, clearly prove that the air of byres is usually polluted to a much greater extent than is generally supposed. Judged by the presence of carbonic acid alone, it is quite common to find byres the air in which is polluted to the extent of from eight to ten times greater than that present in normal air. My experiments seem to indicate that, presuming sufficient inlet and outlet spaces are provided, the chief factor in determining the purity of air in byres is the wind. In an open situation, a building in which the air may be somewhat polluted in a calm day may, under similar conditions in regard to occupancy, be comparatively pure if a breeze, no matter how light, is blowing. These tests also seem to indicate that in cold weather, if a byre is kept at 60° F. or thereby, the air is sure to be badly polluted.

It has usually been considered that cows milk best when kept in a building the air of which has a temperature of from 58° to 62° F. In order to have pure milk, free from contamination, we must have healthy cows in healthy surroundings. Cows living in badly polluted air cannot be said to be living in healthy surroundings, neither are they likely to remain healthy for any great length of time. The question is, How can this pollution of air be avoided? The reply, I presume, can only be, By the admission of fresh air. If fresh air is admitted in sufficient quantity to reduce the pollution to moderate proportions (for we can never hope to have it equal to outside air), under ordinary conditions of weather in winter the temperature of the byre will fall to from 45° to 55° F. The average milk producer

considers such a temperature would so lower the yield of his cows that his business would become unprofitable, and his opinion must be given some consideration, and cannot be lightly thrown aside.

At this point the question resolves itself into two parts—first, Is it necessary to keep cows at 60° F. to produce milk profitably; and second, If not, what conditions are necessary to insure success? To keep cows in a comparatively pure atmosphere at 60° F. during cold weather seems to me to have no alternative but to heat the air. In one instance near Glasgow this has been done, but I very much question if by any means hitherto suggested the gain will be commensurate with the expenditure. Heating byres artificially may, therefore, for the present be dismissed as unprofitable.

Personally, I do not consider that it is necessary for the profitable production of milk in winter in this climate that cows must be kept at or over 60° F. It is well known that animals kept under cool or cold conditions gradually develop a covering of hair which in great part protects them against sudden changes of weather. Cattle of all kinds in early autumn begin to assume a coat, which gradually becomes longer and closer as the weather gets colder. Animals so protected are quite comfortable in temperatures far below 60° F., and if shut up in a byre at that temperature they perspire so freely that their coats become quite wet. If kept warm, such animals speedily shed their hair, because Nature feels it is no longer necessary, and is only a burden to the animals.

In byres which are freely ventilated in early autumn the temperature will be kept moderately low, the stock will, in consequence, gradually assume a longer and more compact coat than they had in summer. This coat is what is so much desired by show-yard judges; consequently most animals taking prizes at the shows presently being held have been kept in cool buildings. With such animals milk can be profitably produced in winter in freely-ventilated byres, which during the cold time of the year will have a temperature of from 45° F. to 50° F. Neither will the milk shrink to any appreciable extent when very cold snaps come on, lowering it to 40° F., or even 35° F., as is so notoriously the case with cows kept in close, warm byres. When turned out in spring, such animals do much better than thin-haired ones, and as warm weather comes on they gradually shed their hair. The present method of keeping cows in milk in winter is an inversion of Nature's method, as, housed as they are now, they have their lightest coats in winter, and, of course, suffer severely if exposed to anything like adverse conditions of weather.

During the past winter a friend and I, each having stocks of

from sixty to seventy cows in milk, have given the system of keeping on the winter hair a fair trial, and, after recently comparing notes, we are both satisfied that the method is on the proper lines. Both of us have had a very satisfactory production of milk during a winter which has not been above the average in temperature. In both cases the byres have been freely ventilated, the temperature being seldom at or over 50° F., yet weeds or chills have been below the average, while no extra precautions were taken other than to sheet all cows for several days after calving.

The designs of the byres I advocate are, therefore, all based on the statements already referred to, and they are only intended for the housing of cows having good, thick coats of hair. As a rule, it is generally preferable to use any building materials which are at hand, rather than bring others from a distance. No matter what the material, the inside walls should be covered with cement for at least 6 feet from the floor, above which ordinary plaster may, if thought necessary, be used instead of cement. The plaster work, whether of cement or lime, should be given as fine a surface as possible. For 6 feet from the ground the cement plaster should be coloured red or pink. This saves painting, and admits of being washed as often as is desired. The plaster work above the coloured cement should be limewashed. The spaces on the top of the wall-head should be carefully beam-filled, as it gives the walls a higher and better-finished appearance, while preventing dust from accumulating.

Where cost is no object and appearance is everything, or, at least, a principal aim, the inside walls may be lined with white enamelled brick. Although these bricks are much more costly than ordinary ones, some portion of that outlay is saved, as no plastering with cement or lime is required. Instead of enamelled bricks, half-inch tiles may be used, more especially where the walls are already built.

The roofs may be of any material which is available; slates, tiles, iron, wood, or thatch, may each make a good enough roof if properly used. From many points of view, a rather steep roof is to be preferred to a flat one, but extremes in either direction should be avoided. Many advantages will be gained by having the byre open to the ridge. Where a more than usually highly-finished building is desired, the woodwork should be planed. The extra cost of this is not much, while it reduces the amount of dust which adheres to the woodwork, and, if thought necessary, permits of the woodwork being varnished or painted.

No material equals cement concrete for floors. It has some dis-

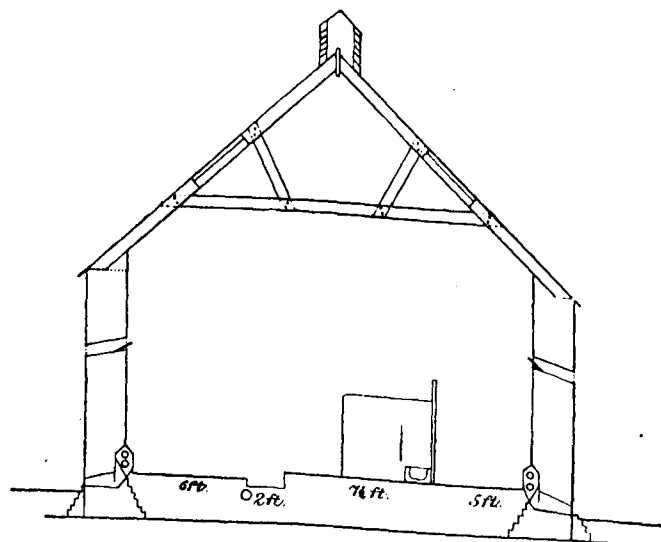


FIG. I.—SINGLE BYRE WITH FEEDING PASSAGE AT THE HEADS.
Heating arrangements: Pipes covered by iron grating at each side. Self-regulating valves on ventilator openings at the ground-level.

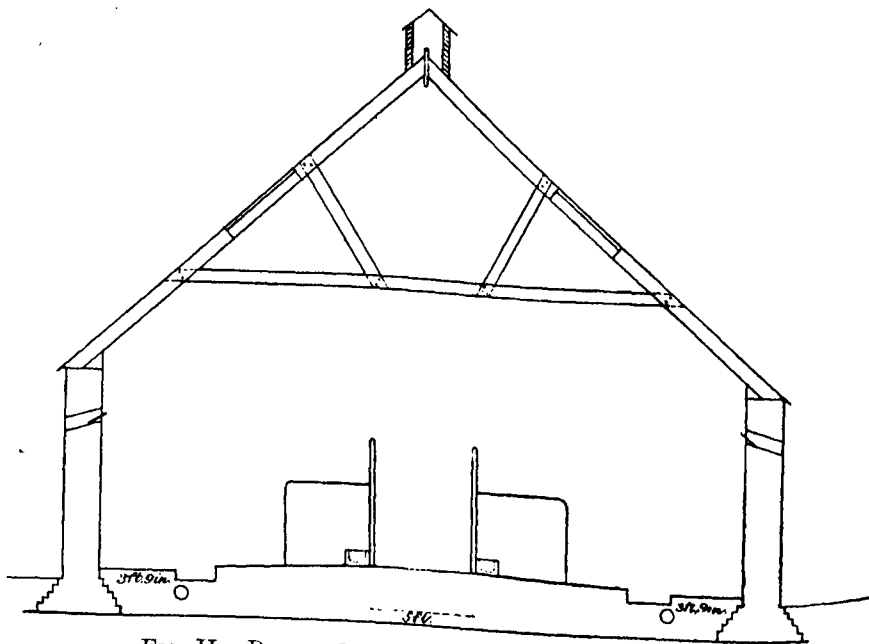


FIG. II.—DOUBLE BYRE WITH CENTRE FEEDING PASSAGE.

SCALE
1 2 3 4 5 6 7 8 9 10 FEET

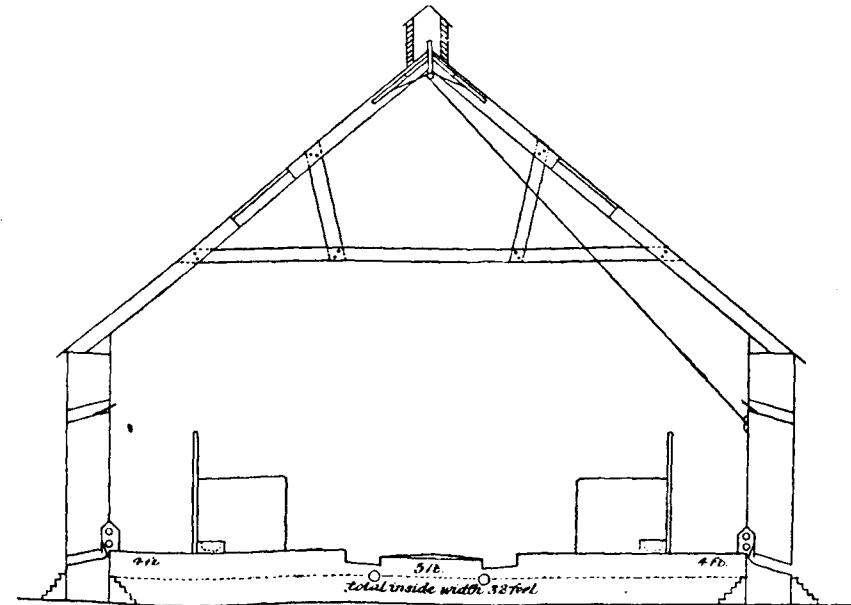


FIG. III.—DOUBLE BYRE WITH SIDE FEEDING PASSAGES AND CENTRE MILKING PASSAGE.

Heating arrangements: Pipes covered by iron grating at each side wall. Ventilators at the ground-level with self-regulating valves.

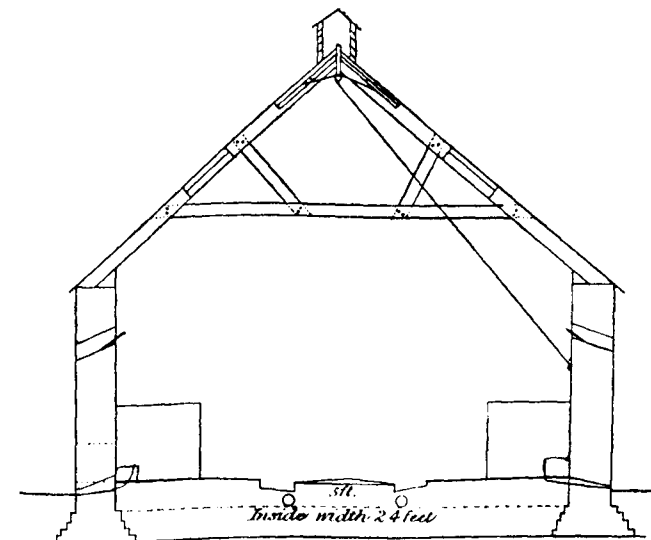


FIG. IV.—DOUBLE BYRE WITH CENTRE MILKING PASSAGE ONLY.
Ventilator opening on the ground-level with self-regulating valve.

SCALE
1 2 3 4 5 6 7 8 9 10 FEET

advantages, but, after all these have been taken into account, its other advantages so predominate that, unless in special circumstances, no other material is to be compared to it. After cement concrete the next best material to use are flags of as hard a nature as possible, combined with a moderately rough grain. Some of the red sandstones of Dumfriesshire are specially suitable, also the rougher varieties from Arbroath and Caithness. Where good hard blue bricks are available, they may be used for the walks and stalls, but cement concrete or flags should be used in preference to them for the manure channels, as the excessive number of joints where bricks are used forms undesirable receptacles for decomposing urine and manure. In some localities water-worn stones are freely used, but while these may be tolerated for the stalls and passages, their use is very undesirable for the manure channels.

The general construction and materials having been decided on, the next important point to settle is the design. On this the suitability of the whole structure really hangs, as inferior materials may be built up into a fairly satisfactory building if the design is right, but if wrong the best materials may be worked up into a bad design, and the result may be a most untidy, unhealthy, and unsatisfactory byre.

Design No. 1 is one of the oldest methods of stalling cows, and, at the same time, one of the most approved. In it only one row of stalls is used, with a feeding passage at the heads and a cleaning and milking passage behind. While this style of byre costs probably more than any other, owing to two passages being provided for each row of cows, it has other advantages which should not be lost sight of. Ordinary farm buildings are usually about 18 feet wide, and this design readily permits of such being easily converted into a very satisfactory byre. A building of this design can also be much more satisfactorily ventilated than most others, while at the same time it permits of all labour being done at the minimum of cost and in the most satisfactory manner. The original cost is not so great per cow as would at first sight appear, for where it is desired to provide a certain cubic or floor space for each animal, the extra passage permits of this being easily done at a very low cost. In such a byre, if each cow is allowed a stall space of $3\frac{1}{4}$ feet, the total floor-space per animal will be $58\frac{1}{2}$ square feet, and if $3\frac{1}{2}$ feet are allowed, the floor-space will be 63 square feet. If 10-foot walls are provided, the cubic space in the former will be 585 cubic feet, and in the latter 630 cubic feet.

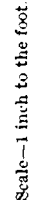
In the dairying districts a passage at the heads has generally been objected to as being unnecessary and undesirable, owing to

the difficulty of keeping the animals clean when so stalled. Very often when cows have been raised after lying for some time they at once pass some excrement. Where there is a feeding passage at the heads the cows usually rise when feeding begins, and in their anxiety to be fed they press towards the passage, and, if the fittings permit, thrust their heads over the division. Should some excrement be dropped at this time, as is usually the case, it falls on the floor of the stall instead of in the manure channel. If this is not at once cleared away, the cow may lie down on it, and thus soil her hind-quarters and probably even her teats. With a feeding animal this is thought little of, but with a cow giving milk it is quite a different matter, as clean milk can never be got from a dirty udder, and dirty milk can never be made clean, and never keeps well. Milk produced under such conditions is disgusting, and it is little wonder that the dairy farmers of the West or South-west of Scotland preferred a byre where the chances of keeping their cows clean would be greater. While the practice has usually been to make the division no higher than the stall division, it has not invariably been so, and it has been found that when the division was high enough there was little more liability of the cows soiling themselves than when stalled with their heads to the wall.

Objections have been urged against cows being stalled with their heads to the wall on the ground of unhealthiness, as, owing to the stall divisions and the bodies of the cows there can be little movement of air where a free current is most wanted. In the air-tests previously referred to by me the air was always found more polluted at the cows' heads than anywhere else in the byre. Where there is a passage at the head of the cows, and where the partition is sparred, the air at the cows' heads need not be worse, and may be better, than it is elsewhere. Where a passage intervenes between the outside wall and the animals there is much greater chance of ventilating the building properly without draughts than there is where the animals are stalled with their heads to the wall. Byres with the cows' heads to the wall, and with only one passage for feeding, cleansing, and milking, are the class most common in use in the West of Scotland. They may be single or double. The double byre is one of the cheapest that can be constructed, and, on the whole, is probably the most popular design of all, and one which has stood the test of many years.

In some of the feeding districts another design of a double byre is very common. In it the feeding passage is in the middle, and the cleaning and milking passages at the sides. In this design each animal breathes across the passage into the face of its neighbour,

A, opening from outside.
BC, cloth or silk valve.
BD, grating for valve to lie against.
BE, grating to keep out straw, etc.
FG, floor of stall.



The diagram consists of two parts. The upper part is a cross-section of a ventilator, showing a rectangular frame with a hinged valve at the top. The valve is labeled 'AB' and is shown in an open position. A rope is attached to the valve and runs down to a pulley labeled 'C'. The lower part is a plan view of the control mechanism, showing a horizontal line with several pulleys labeled 'C' and 'E'. A rope runs along this line, with short segments labeled 'BE' and 'FG' attached to the pulleys. The diagram is labeled 'Fig. VI.—SECTION OF VENTILATOR.' and 'Fig. VII.—DIAGRAM SHOWING HOW ALL THE VENTILATORS ARE CONTROLLED BY ONE ROPE, FG.'

FIG. VII.—DIAGRAM SHOWING HOW ALL THE VENTILATORS ARE CONTROLLED BY ONE ROPE, FG.

AB, valve of wood on the inside of the ventilating opening closed.

BE, short pieces of rope fixed to valve and spliced to rope FG.

C, pulley over which the short rope BE works
FF, pulley over which main rope FFG works.

AI and AK, position of valve when wholly or partially open.

H, outside end of ventilating opening.

while it is difficult to introduce fresh air to the animals, their heads being so far from the outside walls.

The stalls of all byres should slope very gently from the trough to the edge of the manure channel, but in no case need the incline be greater than 1 inch in the whole length. For the smallest size of cows, such as Jerseys, Kerrys, and young Ayrshires, the stall should be from 6 feet 10 inches to 7 feet long, inclusive of the breadth of the trough. For Ayrshires a stall 7 feet to 7 feet 2 inches is quite sufficient, and for shorthorns 7 feet 3 inches to 7 feet 6 inches suits very well. In all cases the length of the stall should be proportionate to the size of the animal it is intended to accommodate, as the inconvenience arising from putting a large animal in a small stall is much the same as putting a small animal into a large stall. For Ayrshire cows each double stall should be from 6 feet to 6½ feet in width, and for the larger breeds, such as shorthorns, 6½ feet to 7½ feet wide.

Each animal should have a separate trough of thoroughly glazed fireclay. Between the troughs there should be a space of about 1 foot, which should be filled up with brick. This prevents a greedy animal from stealing its neighbour's food. The troughs should be small rather than too large, 20 by 16 by 8 inches being large enough for most purposes. The inside edge of the troughs should be as nearly as possible in a line with the wall or stall division, and if not, the angle should be filled up with cement to as long a slope as possible. This trifling precaution prevents food, bits of straw, and filth of all kinds from lodging there and ultimately causing a bad smell, and assists materially in keeping the troughs sweet and clean.

The stall divisions may be of cement, stone, wood, or iron. Coloured cement should, however, be selected in preference to any of the others, as it saves painting, periodic washing being all that is necessary to keep it bright and clean.

The manure channels should be 24 inches wide, and 6 inches deep at the side next the cows, and 4 inches at the walk. The floor of the channel should be ½ inch lower at the walk than at the cows' heels. It should also have a fall lengthwise of ½ inch for each cow. These in themselves may seem trifling details, but they are of immense importance as far as the cleanliness of the animals is concerned. If the channel is made as suggested, it very seldom happens that the manure covers the whole floor of the channel; consequently, when an animal voids any urine it at once runs to the low side of the channel next the walk, where it readily finds a passage to the outside. If a narrower manure channel is adopted,

the solid excrement covers the whole of the floor, damming back the urine, which stands in a pool between each lot of manure. When a cow lies down her tail drops in this urine, which, later on, she switches all over her back, to the future detriment of the milk, the annoyance of the owner, and increased grooming from the attendant. Even where every precaution is adopted, extraneous matter will at times enter the milk, but if the manure channels are badly designed or paved, the production of pure milk is well-nigh impossible, no matter what care is exercised.

A similar result cannot be attained by deepening the channel and making it narrower. A *sine qua non* of an efficient byre is a manure channel 24 inches wide, sloped as suggested, and nothing else will give satisfactory results.

A great deal has been heard during recent years as to the cubic space necessary for cows. While all who have thoroughly studied this question readily admit that a moderate cubic space is necessary before a free circulation of air can be obtained, still, when a minimum comes to be stated, few experts seem to agree. The opinion is now rapidly gaining ground that large cubic space without the other accessories to ventilation is simply money thrown away, and is of less importance than floor space, of which we seldom hear anything at all. Medical officers and county councillors have certainly ridden this hobby to death in not a few districts of Scotland, as is plainly shown by the variation in the different county regulations. My experience leads me to believe that for Ayrshires weighing 8 cwt. live weight, a minimum of 450 cubic feet is ample, which in no case need exceed this by 30 per cent., or, say, 600 cubic feet. For the largest size of shorthorns this means a minimum of 600 cubic feet, with an optional increase to 800 cubic feet. The minimum floor space for Ayrshires stalled in double byres should not be under 35 square feet, nor under 50 square feet for single byres. Shorthorns will require about 20 per cent. more.

If one-tenth of the energy and money which have been spent in advocating and providing large cubic space had been spent in supplying efficient ventilation for the moderate sized buildings already in existence, much more good would have been done. Large cubic space, while it assists ventilation, can never take its place, as even the largest building without ventilation must, after a few hours' use, become as polluted as the smallest one. The wind is the principal factor in efficient natural ventilation, and temperature only plays a secondary part. With a very light breeze, a well-ventilated byre in an open situation may change its air two or three times per

hour, and in heavy winds at many times that speed. This matter is of special note in connection with city byres, which from their position can rarely derive any benefit from the wind as a ventilating force. The ordinary country byre is usually exposed to every wind that blows, while the town one is often surrounded by high houses, which shelter it in every direction, so that the air in the latter is only changed slowly and with difficulty, mainly by difference between the outside and inside temperatures, or during heavy winds. If the air of a byre is changed two or three times every hour, it will remain sufficiently pure for all practical purposes; but before this can be done ample inlets for fresh air and outlets for polluted air must be provided. This, however, is just what is not done, a 3-inch tile here and there, or an opening of a few inches in the roof, being by many thought sufficient. Many byres have not even these, all fresh air having to come in by the doors, and foul air to go out by the interstices of the roof. In an open situation, ample ventilation will usually be provided if from 30 to 40 square inches of inlet area is allowed per cow, irrespective of doors or windows, which should be reserved for special weather. The outlet area should be at least equal to the inlet, or, better still, a little more. In order to provide sufficient ventilation during calm weather, ample inlet area should be provided, and the minimum figures given above may with advantage be increased. In a dead calm, or when there is only a very light breeze, all can be taken full advantage of if the weather is mild; but provision should be made for restricting the inlet area during heavy winds, more especially during cold weather. The principal fresh-air inlets for use during all kinds of weather should be from 5 to 7 feet above the floor, where the animals stand with their heads to the wall. If a passage intervenes between the cows and the air inlet, the latter may be placed much lower, as the current of cold air becomes modified and diffused during its passage across the walk.

Where cows are stalled with their heads to the wall, it has been suggested that inlet openings should be made 1 or 2 feet from the floor. To my knowledge these have been suggested and tried at intervals during the last thirty years, but in no case have I found that anyone continued to use them during cold weather. They are a valuable aid to ventilation during warm weather, where cows are kept in the house at night, as is the custom in this neighbourhood during summer; but, as usually put in, I cannot recommend their adoption for winter use. The usual manner of making these openings is to run them straight through the wall a foot or so above the level of the troughs, hit and miss, sliding or turning valves being

put on the inside or outside to shut off the current in blowy weather. So constructed, the force of the wind usually projects the incoming current of air well into the byre. Such is not desirable, as it is sure to cause chills and weeds. As a modification of this idea, I would suggest that the opening pass through the wall at or below the level of the floor, and turn up between the troughs when the inside is reached. The current would come out in an upward direction in the space between the troughs, the opening to which should be covered with a grating. Inside the opening, where it curves upwards, there should be hung valves of silk or other light material. These valves should be so arranged that, with even a moderate current, the opening should be entirely closed, the valve falling back to its normal position the moment the air-pressure is relieved. In this way these valves would become a species of governor for regulating the force of the wind, allowing the full volume to come in when the speed was low, and automatically wholly or partially closing it when the speed is high. By some such means advantage might be taken of such openings so as to keep them in use during a longer time in autumn or winter; but, as presently constructed, the current blows too direct on the cows to admit of their use at any time unless during warm weather.

A simple method of providing inlet openings higher up for ventilation purposes is to place a 6-inch round or square tile in the wall, with 2 inches of rise or so from the outside inwards. If the inside of these is made flush with the face of the wall, and a board is placed across the openings, by cutting openings in the board opposite each tile and moving it backwards and forwards a simple means is provided by which all the openings on one side of a byre can be wholly or partially closed at once.

Where oblong openings are used, these may be effectively controlled by hanging a board inside the opening. By connecting each board with a cord, all of them may by one pull be raised or lowered, so as to turn the incoming current well up in blowy weather, or they may be allowed to fall back, and permit the full volume to come in when it is calm or mild. The use of proper ventilating arrangements easily permits of the openings on the stormy side being wholly or partially closed, while they are fully open on the lea side. It is in such a case that openings mechanically closed show to most advantage, as the attendant has no reasonable excuse for having them open when they should be closed, or closed when they should be open.

Roof ventilation should be ample, being at least fully more in area than the inlets, and arranged in such a way that, as far as

possible, down-draughts are prevented. The design is immaterial, provided it is properly carried out. In one case which has come under my observation the boarding of the roof for a foot on each side of the ridge is hinged so as to fall back. This is controlled from the floor, and gives a large outlet area per cow. Louvre-board ventilators suit very well, provided they are sufficiently wide and high. Provision should be made for restricting the outlet area as well as the inlet area when the weather is stormy or when the byre is only partially filled.

It is difficult to say how much of the advantage of an outdoor life is due to fresh air and how much to light, but from what is known of the advantages of the latter no one doubts but that it is considerable. To do so, one has only to look at the countenance of miners and others who work in artificial or subdued light, and compare their chalky appearance with that of the ruddy cheeks and bronzed faces of all leading an outdoor life. At the present time the ventilation of mines is so complete that most miners work in an atmosphere little contaminated by noxious gases or expired air, yet these men seldom have the appearance of first-class health. Of all the details connected with the construction of byres in the past, few have received so little consideration as that of lighting. In fact, in many byres otherwise good no light enters except what comes in at an open door. A common belief even prevails that stock fatten quicker in the dark than in the light, so that no one need wonder at the great absence of light in many byres built a generation ago. Ian Maclaren, in "Auld Lang Syne," refers to Drumtochty putting windows in his byre so that the cows might see what was going on outside, and so be prevented from wearying. While windows are not exactly wanted for that purpose, they are wanted if for nothing else than to see the dirt. Few things contribute so much to cleanliness in a byre as plenty of light. It costs very little, and has great health-giving and disease-preventing powers. Personally, I prefer to see byres lighted from the roof rather than from windows in the walls. If lighted from the roof, the light should be brought from the north or east side. Sufficient light should be provided to do away with all shade, and for this purpose 3 square feet per cow will not be found an excessive amount.

The prevailing opinion now is that there should be no covered-in drains inside the byre, and where the urine can be run direct to the outside I agree with it. Such, however, cannot always be done, and, with proper traps inside and out, no one need hesitate to go against the general rule. The urine should run into a tank

placed reasonably near the byre, and close to the dungstead. The drains to the tank should have as steep a gradient as possible, and be no longer than can be avoided, for urine drains are proverbially difficult to keep clear. Where the gradient is low, or the length great, ample provision should be made for inspecting and cleaning the drains by inserting pipes with loose covers to every 10 yards or so, and at every bend.

The water supply should not only be of good quality, and ample for the wants of the animals, but should be sufficient to permit of thoroughly washing the walks and manure-channels daily.

In the management of a dairy, cleanliness, instead of being next to godliness, comes before it, and instead of being restricted to the milk-vessels only, should be apparent everywhere. If the cement travises and walls have been coloured, they should be washed at frequent intervals, and if not, they should be water-painted at least twice a year. White should be the colour for the walls above 6 feet from the floor, for which limewash is ill to beat. The upper walls and the woodwork of the roof should be swept clear of cobwebs several times a year, while the floors should be washed and scrubbed daily. The cows should be combed and brushed regularly. To me it has always been a mystery why farmers should consider it necessary to comb and brush a horse twice daily, and yet think a cow should never require such at all, for there are thousands of cows in the country which have never had a comb or brush on their backs. The litter should be straw, and plenty of it, moss litter being quite unsuited for bedding cows, owing to the dust from it adhering to the bodies and udders of the cows. During milking the dust becomes detached, and more or less of it sooner or later finds its way into the milk. Once milk has become contaminated by filth of any kind, no sieve or filter yet invented can restore it to its original condition. Sieves are necessary evils, which seemingly cannot be done without, and therefore must be endured, but what they are intended to take from the milk should, in reality, never be in it. An improved sieve or filter is much needed, but none seem better for ordinary purposes, if kept in good order, than the old-fashioned hair-sieve, or wire-gauze and muslin cloth.

In order to prevent tampering with the milk, or even the suspicion of such, all cans should be secured by lead seals before they leave the farm. In his own interest, every producer would do well to protect himself by adopting this precaution.

Where it is necessary to keep milk in warm weather for even a limited length of time, it should be preserved by cold rather than

by heat. The latter has become fashionable of late, but, in my opinion, the use of all pasteurizing appliances for milk is a mistake. By their use partially damaged milk has its faults cloaked over for a time, at the expense of its nutritive qualities. Where it is necessary to keep milk for any length of time, the application of cold is the proper method to follow, as it neither cloaks over faults nor deteriorates it in any way. The day is not far distant when I hope to see all milk enter the City as cold as possible, and thereafter be kept in cool rooms, where the temperature can be kept low and uniform by any of the methods in use for this purpose.

ROYAL MASONIC INSTITUTION FOR BOYS (ELECTION, OCTOBER, 1900).—The Editor will be glad to receive votes on behalf of William Peehey Smart, aged seven years. He is the eldest of a family of five children. His father, W. P. Smart, L.R.C.P. and M.R.C.S., was in medical practice for some years at Fressingfield, Suffolk, and medical officer of health of Hoxne Union, but from failing health was obliged to relinquish his practice, is now in greatly reduced circumstances, and without the means of providing for the education of his children.

"SMOKE COLOUR" FOR SAUSAGES.—Several samples of a "smoke colour" recommended as a perfectly harmless preparation for use in the manufacture of Frankfurt and other forms of sausage have been examined by Juchenack and Sendtner (*Zeitschrift für Untersuchung der Nahrungs und Genussmittel*, 1899, p. 417), who report that they consist of Orange II., the sodium salt of azo- β -naphthol-sulphanilic acid. As much as can be taken up on the point of a knife is dissolved in about 20 litres of water, and the solution is then used cold or at the boiling-point, according to the kind of sausage. In the proper dilution it imparts a fine reddish-brown colour to the casing, and makes the sausage appear as if the whole of its substance had been smoked, when such is not the case. Animal experimentation demonstrated the harmlessness of the agent.—*Amer. Jour. Med. Sciences*.

CAUSE OF CANCER.—Roswell Park (*Buffalo Medical Journal*, March, 1900), in discussing the cause of cancer, gives it as his personal opinion that cancer is of parasitic origin. Not one parasite, but probably many, are responsible for the various malignant growths. In their labours at the State Laboratory in Buffalo, they have received increasing confirmation of this belief. They have found in all carcinomata certain bodies resembling fat, but which are not soluble in ether nor alcohol. These are the bodies described by H. G. Plimmer in the April number of the *London Practitioner*, 1899. Park says that in their recent work, in which cancer-tumours are introduced into living animals, they were able to find these bodies in large numbers in the enlarged lymph-nodes of the animals. They have been able in one case to produce a true adenocarcinoma in an animal by inoculation with fluid from the peritoneal cavity of a man suffering from colloid cancer of the omentum. In this fluid was found an organism which apparently belongs to the yeast group, but which they were unable to cultivate. The laboratory is in possession of pathogenic yeasts which various investigators have isolated from cancer, and experiments are being performed with them. These organisms are exceedingly polymorphic and difficult to deal with.—*Philadelphia Medical Journal*.

DIARRHŒA IN NORTHERN TOWNS.

OLDHAM.

By J. B. WILKINSON, M.D.,
Medical Officer of Health.

IN making an inquiry into the situation and causes of epidemic diarrhœa in the town of Oldham, I did not expect to discover any new particulars respecting this disease, concerning which so much has been written and said during the last few years. I desire, however, to place on record the conditions which are found in connection with the disease in a town which, in comparison with other towns of a similar size, enjoys a singular immunity. Respecting the town itself, the gradients on the north side are steep, the levels varying from 400 to 1,100 or 1,200 feet above the sea-level. On the south and south-west the gradients are much less steep, though there is a gradual slope on all sides to the confines of the borough.

The geological formation is rock in the higher parts of the town, with boulder clay and shale overlying the coal-measures towards the south. Here and there sand-pockets occur.

There are, for the size of the town, comparatively few courts and alleys. A great number of the courts, alleys, and back-passages are paved, and where paved are regularly swept by the municipal authorities. Where not paved they are supposed to be kept clean by the residents.

The investigations were especially directed to the deaths of infants under one year from diarrhœa during the three months from July 9th to October 7th. All deaths certified as due to catarrh of the intestinal tract, and deaths due to an ill-defined cause, with diarrhœa as a secondary cause, were included in the list. In the above period of three months 111 cases of diarrhœa which terminated fatally commenced their illness, and during the same period 110 of the patients died, one case not resulting in death until the end of October.

In Chart A is a comparison of the period of the epidemic obtained by recording (1) the date of the deaths and (2) the date on which the various cases commenced to be ill, and, as might be expected, these periods are not the same. Roughly speaking, the record of the death-dates makes the epidemic a week later than when recorded, as most epidemics are, from the date of the onset of the disease. In Chart B the epidemic appears much more regular,

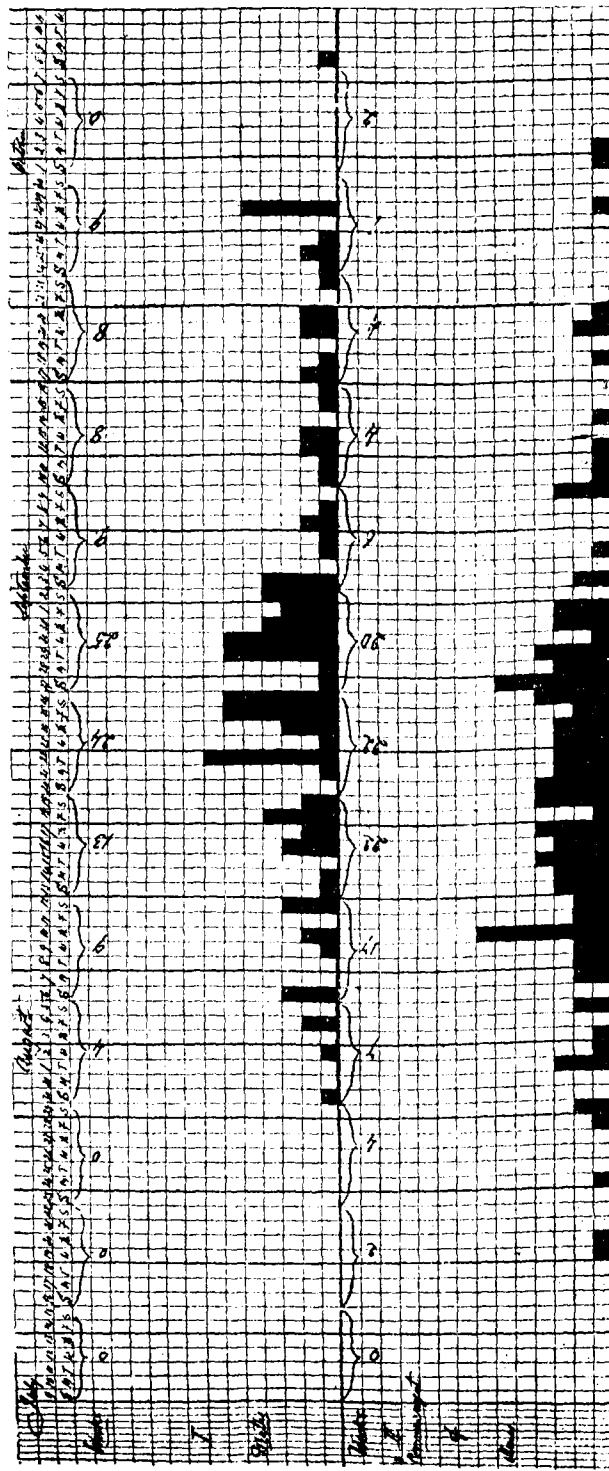


CHART A.—EPIDEMIC OF DIARRHOEA. COMPARISON OF DATES OF DEATH (I.) AND ATTACK (II.).

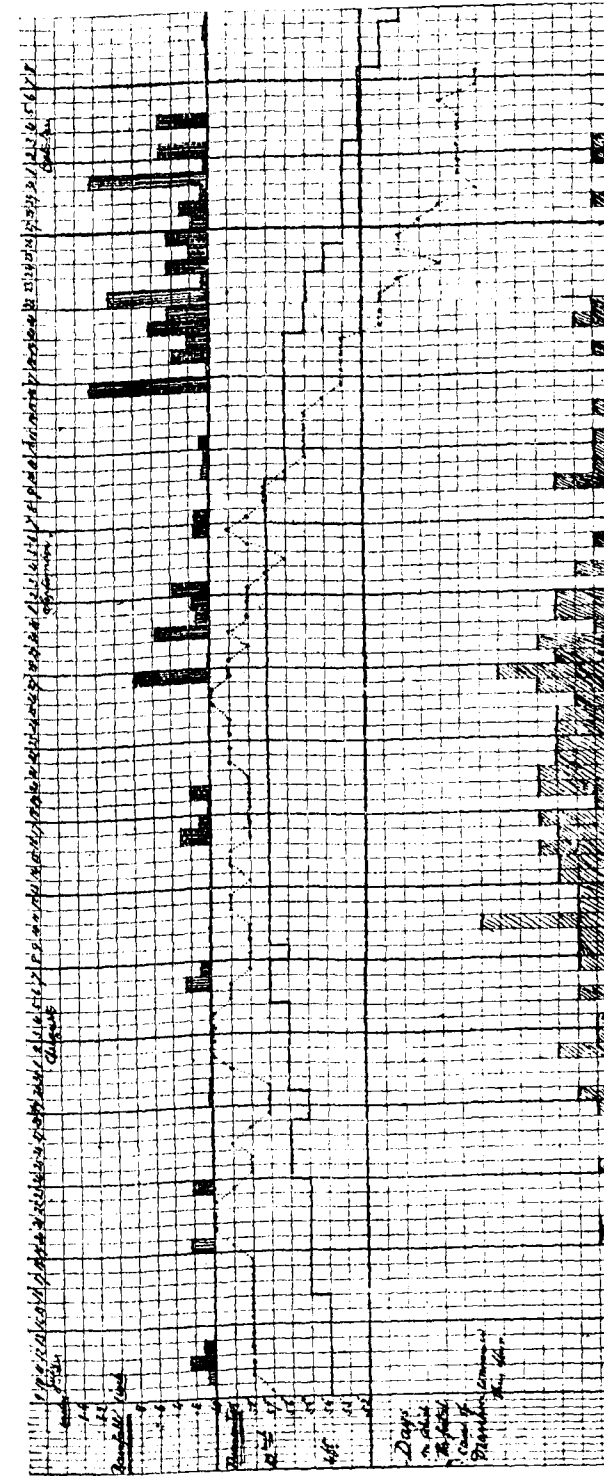


CHART B.—EPIDEMIC OF DIARRHOEA. COMPARISON OF METEOROLOGICAL ELEMENTS AND DATES OF ATTACK.

and to last a shorter period, than when taken from the deaths as in Chart A.

In Chart B the epidemic (as recorded from the dates of onset) is compared with various meteorological conditions. It will be seen that the epidemic practically commences about a week after the temperature of the earth at 4 feet reaches and remains at 56° F. This has been so often recorded that it may be taken as an almost certain indication that the diarrhoeal epidemic is approaching, and the attention of the public should be drawn to the conditions which cause and the provisions which can be taken to prevent it. The epidemic does not, however, in its course exactly follow the curve of the earth-temperature at 4 feet, as a temperature of 56° F. was recorded at this depth at least a week after the epidemic had practically subsided.

The temperature recorded by the 12-inch thermometer bears a much closer relation to the course of the epidemic, and if the temperature above or below 58° F. be compared with the rise and fall of the epidemic, a very close relationship will be noticed, the epidemic subsiding when the temperature falls below 58° F.

The amount of rainfall has apparently some influence upon the disease. After the sudden and fairly heavy fall of rain towards the end of August the epidemic declined.

In the table giving the relative prevalence of diarrhoea in the large towns of this country, published by Dr. Newsholme in his Presidential Address,* it will be noticed that the towns least affected, viz., Edinburgh, Huddersfield, Halifax, Bristol, and Oldham, are all towns with steep gradients, and it might be expected that the lower and more level parts of the town would be most affected. But in preparing a map showing the distribution of the disease in Oldham it was found that the epidemic commenced on the north-east slopes of the range of hills entering Oldham from the north, and spread round the hill to the south-western side, and last of all and very much less affected were the lower districts, although in these are some of the poorest and most thickly-populated parts of the town.

The connection of the disease with imperfect sanitary conditions was very marked, though, on the other hand, two small districts which might be looked upon as insanitary areas had not a single death from diarrhoea recorded.

In back-to-back houses the disease was certainly more prevalent than in through houses, and one fact was especially noticeable, viz., that the majority of the cases in this class of house occurred

* See PUBLIC HEALTH, xii. 138 (December, 1899).

on the sunless side of the street or in dwellings under the shadow of mills or other large buildings.

The effect of overcrowding upon the disease was not so marked as might be expected, 67 per cent. of the cases occurring in houses in which there were less than 1½ persons to each room, 24 per cent. in houses with 1½ to 2 (both inclusive) persons to each room, and 9 per cent. with over 2 persons to each room.

Certain conditions which favour the collection of decaying material, and consequent surface pollution of the soil, are very frequently prevalent, especially when these conditions are associated with imperfect drainage, allowing the retention of water after rain upon the surface of the yards or back-passages.

In houses which are supplied with water-closets, one case of fatal diarrhoea occurred to every 708 houses. In houses supplied with slop or waste-water closets, one case occurred in every 394 houses; and where the houses are furnished with sanitary pans, one case in every 214.

Comparing ashpits with ash-cans, one case of diarrhoea occurred in every 366 houses supplied with ash-cans, and one case in every 230 houses to which ashpits are attached.

As imperfect sanitary conditions, and especially collections of filth, would seem to be the constant accompaniments of epidemic diarrhoea, the very high preponderance of cases among artificially-fed children points to the food as the means of conveyance to the patient. In only two cases was there the same milk-supply, thus exonerating the milkman.

As to the method of feeding, 13 per cent. of the cases occurred in children fed by the breast alone, 23 per cent. in children fed by the bottle and breast, 53 per cent. in children fed by the bottle alone, 11 per cent. in children not fed by either.

In several of the houses where the fatal cases among breast-fed children occurred, serious sanitary defects were found, such as untrapped and blocked drains; and in a large proportion of the cases the mother or other persons in the house were suffering from the same disease.

WIGAN.

By W. BERRY, F.R.C.I.,
Medical Officer of Health.

The report of the committee appointed by the Royal College of Physicians, London, as to the nomenclature of diarrhoea, which has been adopted by the College, recommends the use of the term

"epidemic enteritis" as a synonym for "epidemic diarrhoea," and the discontinuance of the use of the terms "gastro-enteritis," "muco-enteritis," or "gastric catarrh." I do not like the term "epidemic enteritis"; "zymotic enteritis," as suggested in a leading article in the *Lancet*, is better. Before we can arrive at anything like a fair comparison of deaths from diarrhoea, we must have a definite understanding of what we mean by "epidemic enteritis" or "zymotic enteritis." I prefer the term "autumnal diarrhoea," for the reason that the largest proportion of these deaths take place in the autumn.

Diarrhoea is usually employed to indicate a too frequent discharge of liquid motions from the bowels, and, like its opposite (constipation), it is only a symptom of some other disease or a functional derangement, not an organic disorder or a disease *per se*.

Causes of Diarrhoea.—In Professor Clifford Allbutt's "System of Medicine," vol. iii., Sir T. Lauder Brunton says that it is due to an unusually watery condition of the intestinal contents at the time when they reach the rectum and are evacuated. He mentions the following forms of diarrhoea:

Diarrhoea from purgatives,
 " " food,
 " " microbic poisons,
 " " entozoa,

and numerous other forms.

In the same work Dr. Eustace Smith describes the diarrhoea of children under two heads:

1. Acute diarrhoea.
2. Chronic diarrhoea.

He gives three varieties of acute diarrhoea:

- (a) Simple non-inflammatory diarrhoea (mild intestinal catarrh).
- (b) Inflammatory diarrhoea (acute entero-colitis).
- (c) Choleraic or septic diarrhoea (summer diarrhoea, cholera infantum).

It is with classifications such as these that the ordinary medical practitioner is concerned, and he certifies accordingly.

What we as health officers mean is the diarrhoea from microbic poisons or septic diarrhoea, and a term such as "zymotic enteritis" meets the case, and until we can get uniformity in certification we cannot compare the death-rate from zymotic diarrhoea of one town with another.

Dr. Newsholme's very able paper in *PUBLIC HEALTH* for December does not help us much in elucidating the very great differences from this disease in similar towns. Why the prevalence of diarrhoea in Halifax should differ so much from that of Preston, or that of Oldham from that of Blackburn, it is difficult to imagine.

Deaths from Diarrhoea for the past Twenty-five Years.

Year.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Total.
1875	9	12	80	14	115
1876	14	7	79	21	121
1877	8	8	44	9	69
1878	7	15	84	6	112
1879	2	5	20	3	30
1880	4	7	85	12	108
1881	5	5	22	15	47
1882	4	12	37	11	64
1883	8	7	49	16	80
1884	5	6	66	6	83
1885	3	3	21	14	41
1886	2	6	56	9	73
1887	7	6	99	18	130
1888	5	4	19	9	37
1889	1	5	80	4	90
1890	6	6	69	19	100
1891	2	2	47	28	79
1892	7	6	55	14	82
1893	12	34	123	15	184
1894	5	13	37	20	75
1895	12	9	80	27	128
1896	2	4	33	9	48
1897	2	4	64	3	73
1898	1	0	37	8	46
1899	2	1	67	6	76

Now, as to the causation of zymotic diarrhoea, we have not advanced much beyond Dr. Longstaff's conclusions in 1880, when he says that "summer diarrhoea is caused by the pollution of air, water, and food with some product or products of the decomposition of organic matter during very hot weather."* And although I cannot bring statistics to prove what I say, I believe that a high earth-temperature (56° F.) and a low rainfall are conducive to this disease. We must not forget that at this time in the third quarter of the year diarrhoea amongst adults is much more common than at any other period, so that, whatever the cause is, it is the

* *Vide PUBLIC HEALTH*, xii. 150 (December, 1899).

one common cause or the same *materies morbi*. I feel also convinced that in towns in which houses have been built on filled-in or made foundations, and where privy middens have been common, the subsoil having become saturated, zymotic diarrhoea is more prevalent. It is, as Dr. Newsholme remarks, a "filth disease," and the poison or germ gains admission into the system either through the air, food, or water.

I give (on p. 799) a table of the deaths from diarrhoea in Wigan for the past twenty-five years, showing that invariably the third quarter gives us the greatest number of deaths.

I have purposely refrained from mentioning artificial feeding of children, injudicious feeding of adults, insanitary surroundings, etc., all of which set up the mischief when the other conditions are present.

ST. HELENS.

By F. DREW HARRIS, M.B.,
Medical Officer of Health.

For the past seven years every death from diarrhoea in St. Helens has been investigated, chiefly from the point of view of food as an antecedent cause. The statistics which we have thus obtained are probably very similar to those obtained in other places. Taking the last eight years (1891 to 1898), on an average 66 per cent. of the deaths from diarrhoea occurred under one year, ranging from 79 per cent. in 1894 to 63 per cent. in 1895. In 1899, however, this percentage considerably decreased, and was only 54.4 per cent. Taking the deaths from gastro-enteritis, the average percentage for the past eight years (1891 to 1898) under one year was 60.5, ranging from 66.6 per cent. in 1897 to 49 per cent. in 1892. During last year the percentage was low, being only 52.7. Coming now to the method of feeding, we found the proportions of deaths of bottle-fed infants under one year to total deaths under one year were as follows:

AGE.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
0 to 3 months...	%	%	%	%	%	%	%
3 " 6 " ...	72	90	85	85	64	76	57
6 " 12 " ...		100	85	85	85	83	92
		100	100	100	100	100	100

I regret that I am unable to-day to give the figures for the whole seven years regarding the method of excrement disposal chiefly

found in houses where diarrhoea deaths have occurred. In the one year, however (1899), 37 per cent. occurred in privy-midden houses, 58 per cent. in pail-closet houses, and under 5 per cent. in water-closet houses.

For the past seven years the temperature of the soil at 4 feet has been taken daily in St. Helens, and the rise in the diarrhoea mortality coincident with the 4-foot thermometer reaching 55° has been very marked. I cannot say that my experience confirms that of Dr. Newsholme as regards rainfall. Both in 1897 and 1898 the rainfall in August was excessive, yet in spite of this fact the death-rates from diarrhoea were among the highest ever recorded in the borough.

A point which has, I think, received little attention in connection with the prevalence of diarrhoea is the level and fluctuations of the subsoil water. In August, 1897, a most remarkable storm occurred in St. Helens, 2½ inches of rain falling in forty minutes. This storm was followed in about three or four days by an outbreak of diarrhoea and enteric fever to a rather alarming extent.

I am afraid that the figures I have given you add very little to what is already well-established knowledge. They, however, tend, I think, to confirm the conclusions which have been previously arrived at—namely, that the infection is mostly conveyed by means of food, and that organic pollution of the soil and a certain given temperature are necessary for an epidemic. The one thing which I would emphasize particularly is the prevalence of this disease amongst bottle-fed infants, and I regard as satisfactory that in a year when diarrhoea has been almost universally severely prevalent the death-rate in St. Helens has been little above the average, while the saving in life has been almost entirely in children under one year.

THE RELATION BETWEEN SUNSHINE AND THE PREVALENCE OF INFLUENZA.—In view of the known bactericidal influence of sunlight, it would not be surprising to learn that an inverse relation exists between the amount of sunshine and the prevalence of infectious diseases, providing, however, the temperature is not excessive. Some observations recorded by Ruhemann (*Berliner Klinische Wochenschrift*, 1900, No. 9, p. 199) appear to indicate that influenza is more prevalent when the amount of sunshine is less, and it is not impossible that a similar rule would be found to apply to other infectious diseases also. In the eight years from 1883 to 1900 the number of hours of sunshine during the month of January, when influenza was exceedingly prevalent, was between 9.8 in 1900, and 62.3 in 1899—the mean being 36.4. A similar state of affairs was observed in Magdeburg, where from 1882 to 1900 the number of hours of sunshine varied during the same month between 19 in 1900 and 86.3 in 1883. Similar figures were obtained in observations made in other cities of Germany.—*Phil. Med. Jour.*

THE COMPULSORY NOTIFICATION OF MEASLES AND INFECTIOUS PNEUMONIA.*

By Dr. E. VALLIN.

At the meeting of the Academy of Medicine on February 20th last, we showed that whilst the mortality from the group of (notifiable) infectious diseases has diminished notably in Paris during the last four or five years, that from measles has continued to increase, as is proved by the mean annual number of deaths from 1895 to 1899, viz., measles, 785; enteric fever, 364; whooping-cough, 356; diphtheria, 355; scarlatina, 150; and small-pox, 12. So that after tuberculosis, which causes 12,000 deaths per annum, measles is the most fatal zymotic disease in Paris. The deaths recorded from measles numbered 679, 658, 821, 876, and 904 in each of the years 1895-99.

The increased mortality from measles is, in our opinion, partly due to the fact that, notwithstanding our efforts in 1893, the notification of this disease has not been made compulsory. As a consequence, the public imagine that disinfection after it is useless. Whilst the total number of disinfections effected by the municipal service has increased each year by such bounds that it has grown from 38,000 in 1895 to 50,000 in 1898, and 64,000 in 1899, disinfection has steadily become less frequent after measles, as is proved by the following table:

	1895.	1896.	1897.	1898.	1899.
SCARLET FEVER.					
No. of deaths	178	170	65	117	195
Disinfections	8,336	8,914	4,877	11,355	11,448
MEASLES.					
No. of deaths	679	658	821	865	904
Disinfections	2,633	2,535	2,955	3,090	2,232

While the services of the officials of the municipal disinfecting staff, acting on the instruction of the administration, are received with an increasing eagerness after a case of, or a death from, small-

* From an editorial in the *Revue d'Hygiène* for April, 1900. Translated by H. E. A.

pox, enteric fever, diphtheria, or scarlet fever, the officer sent after a death from, or removal to hospital of a case of, measles only too often receives the reply: "Nobody disinfects after measles now; it's of no use." The medical practitioners are perhaps partly to blame for this, in that, while affirming, as they doubtless do, the highly contagious character of measles, they allege that the virulence of the specific organism lasts only a few hours, and that the infectivity of the disease being at its maximum before the appearance of the rash and during the first few days afterwards, its spread is inevitable, whatever be done.

We are compelled to point out that the instability of the organism of measles, which, although hitherto undemonstrated by experimental proof, seems to be a reality, has been somewhat exaggerated. This virus may remain active several days, and if protected from air and light, as in the joints or crevices of floor-boards, or the close folds of a bundle of clothing, would appear able to survive for many months or perhaps years. Granting that everyone must, at least once in his life, be a victim to measles, it is not a matter of indifference whether the attack occur at three months of age or at fifteen years, in full health or during convalescence after a grave illness, in summer or in winter, during a malignant epidemic or a mild one. It is therefore important then to adopt every means to prevent attacks of the disease when they are likely to be particularly dangerous or harmful. In a word, disinfection and isolation are useful, not only against a mild attack, which is without ill-results, but also against those pulmonary complications which are frequently fatal. The destruction of the pneumococci and streptococci thrown off by the primary patient is needed to prevent organisms being implanted on the mucous membrane of a secondary patient in the early stages, when it has been denuded of its protective epithelium. It was on this account that we urged, as did M. Kelsch in 1898, the Academy to include measles among the diseases whose notification was made compulsory by the law of November 30th, 1892. The effect of such inclusion would be to remind the public that prophylactic measures can be adopted against measles, and would facilitate the protection not only of children in schools, but also of the infants between three months and three years of age, who succumb to this disease in such large numbers in *crèches*. Our proposal was adopted without opposition at the meeting of the Academy of February 27th last.

M. Grancher, who was absent when the vote was taken, informed the Academy at its next meeting (March) that he approved of the resolution, not because its object was the prevention of uncompli-

cated measles, against which disinfection was, in his opinion, useless, but because such resolution would facilitate the adoption of measures for the destruction of the virulent and persistent pneumococci and streptococci, and thus prevent the complications of measles. M. Grancher, although a professed believer in disinfection, considers that its influence in effecting the diminution of diphtheria, small-pox, scarlet fever, and enteric fever in Paris has been exaggerated; that result he attributes more to revaccination, the use of antidiphtheritic serum, and the provision of a good water-supply. His idea is that the efforts of disinfection should be directed against tuberculosis, pneumonia, and broncho-pneumonia; and for the better securing of this, he asks the Academy, on the one hand, to include these ailments in the list of notifiable diseases, and, on the other, to remit the following proposition to the Committee of the Academy on tuberculosis: "The Academy is of opinion that *verified* tuberculosis (*tuberculose ouverte*) should be included among diseases compulsorily notifiable."

Without being extremists as regards disinfection, we think M. Grancher has underestimated the part played by this prophylactic measure. In small-pox, for example, revaccination cannot be too strongly recommended; but there are always many thousands in Paris who will not be revaccinated or even vaccinated. So that to the protection afforded by vaccination it is prudent to add the destruction of the variolous germ by disinfection. Statistics show that in Paris during 1899, for one single death from small-pox, corresponding to 155 cases (*sic*), 177 disinfections have been done. In other words, disinfection was carried out after all the cases (and more) of small-pox, whilst after measles disinfection was effected after 2,232 cases only, equal to $2\frac{1}{2}$ per death. Of about 12,000 cases of measles in Paris in 1890,* 9,000 completely escaped disinfection. It is impossible that these 9,000 cases have not aided in the propagation of the disease. So also sero-therapy greatly reduces the mortality of diphtheria, but diminishes very little the contagion and spread of the malady.

M. Grancher, after a rigorous use of disinfection and isolation in cases of measles at the Sick Children's Hospital, has almost completely abandoned such measures, because they have not sensibly diminished the number of "hospital" attacks. He considers that these latter are due to indirect importation, *i.e.*, through the medium of a third (healthy) person. He is now content to isolate behind a glass screen every child admitted with fever who has not

* Query 1899.—Ed. P. H.

had measles. The results during the past four years have been excellent, spread among the patients having become rare.

To this we reply that in a great Parisian hospital the crowd of relatives, children, visitors, patients, students, and physicians moving about all day in the wards, the furniture, foul linen, etc., maintain a perpetual supply of infection. M. Grancher destroys daily the infective *matrices* thrown off by patients in the wards; but a practically equal amount is brought in next day with persons and articles from the outside. The contagiousness of enteric fever, not recognised in the great hospitals of Paris, was demonstrated sixty years ago by Bretonneau, Gendron, and Piedvache in smaller hospitals. It is in the small garrisons that the progress and origin of epidemics of measles have been traced by military surgeons, whose general opinion is that too much reliance ought not to be placed on the low resistance of the organism of measles, and that disinfection is useful. If they see fifty or a hundred cases of measles succeeding each other in a barracks, are they to fold their arms and say to the commanding officer of the unit, the military routine of which is disorganized: "Measles is the most inevitable of the contagious diseases; I can do nothing with it"? Such *non possumus* doctrine would be a discredit to medicine, and would entail the abandonment of hygiene and prophylaxy.

Besides, experience shows that epidemics of measles are often stopped, and their duration arrested in the following manner: The first case is sent immediately to hospital; the sick-room and its contents are disinfected the same day; unless want of space in the barrack prevents, the room is vacated, the floors are washed with cresyl, and the walls are limewashed or sprayed with antiseptic solution. Every morning for a week the bedclothes are carried into the yard and exposed to those great germicides open air and sunlight. For at least a fortnight the men who had occupied the same room and come in contact with the patient have to report themselves to the doctor, who examines the surface of their skin, the mucous membranes, palate, uvula, etc. Every one, indeed, who comes up for sick parade for any ailment whatsoever is subjected to a special examination in view of measles. In this way faint rashes are often detected on men who did not suspect they could infect their comrades by walking with them. Prompt diagnosis and isolation lessen at least by one half the risks of contagion and spread.

To those who consider that isolation always comes too late, and that disinfection is useless, we would say: It is a fact that the army medical men always disinfect the bedding, effects, and sick-room after measles. Are we to tell them to cease doing this?

As for pneumonia and broncho-pneumonia, it has been demonstrated that with the exception of traumatic cases or direct irritations, these are always the result of infection by pneumococci, streptococci, etc. They are, consequently, always infectious and transmissible. But there are still many physicians who regard pneumonia as the type of idiopathic inflammation, and, being already hostile in principle to the violation of this somewhat overstrained professional secrecy, revolt, like M. Lereboullet, at the thought of being compelled to notify every case of these diseases. We suggested, therefore, that the cases should only be notified when "epidemic and infectious." We, however, readily omitted "epidemic," since every infectious malady may become so, and it would not be hygienically consistent to wait for an epidemic before taking measures to prevent it. The term "infectious" will not embarrass those physicians who regard every pneumonia as infectious. As for those who regard as infectious only those malignant cases which "fulminate," and end early in suppuration, and spread contagion around, such as are met with in measles and influenza, notification would result in official intervention just where preventive measures are most urgently needed. Each class of practitioner would act according to his views, i.e., he would notify as soon as he has become aware, as required by Article 15 of the law of November 30th, 1892.

[After a discussion occupying no less than three meetings, the Academy, on April 3rd, adopted the following proposition of M. Grancher, as amended by M. Vallin: "The Academy is of opinion that infectious pneumonia and infectious broncho-pneumonia should be included in the list of compulsorily notifiable diseases."]

In the course of the discussion referred to several of our colleagues, some of them members of the Academy, told us that one of the motives of their opposition to notification of infectious diseases was the extremely high cost of municipal disinfection, the first outcome of notification. Some of their patients had paid many hundreds of francs for the mere disinfection of a room and the effects of a contagious case!

The error is evident, as the following tariff, adopted after slight modification by the Municipal Council on July 13th, 1899, shows:

(Here follows a table, from nothing for dwellings of low rental to 100 francs, highest class.)

The author goes on to say that in the case of premises rented at 6,000 francs, and in the case of all the rooms, rental of all their contents, is only

45 francs. The city of Paris spends 600,000 francs per annum on this service, and does not recoup itself by the charges to the extent of more than 40,000 francs. The service is therefore practically gratuitous, carried out for the public health.

Some very curious facts in this connection were brought to light some time ago. Competing keenly with the municipal service of disinfection there are several private undertakings, some of which are respectable, and some very much the reverse. The latter employ representatives, who bribe concierges, undertakers' men, and even in some cases the subordinate public officials. Immediately after a death in a house—often when it is only expected—a representative of one of these presents himself at the house in a laced cap, stating he is sent by the "sanitary authority." He collects the bedding, takes it down to a deceptive-looking conveyance which stands at the door, brings in his disinfecting appliances, and starts complicated operations in the house as though disinfection were compulsory and he the official representative of the sanitary authority. Nine times out of ten he is allowed to proceed. The charge is extraordinarily high, while the disinfection may be purely illusory.

As a matter of fact, notification does not necessarily imply disinfection. The latter is never enforced compulsorily, but only offered by the authorities, whose officers, having no moneyed interest to force the process, rest content with a simple refusal.

ELIMINATION OF BACTERIA THROUGH THE MAMMARY GLAND.—The contention of Basenau, that under ordinary conditions the mammary glands are not an exit for bacteria circulating in the blood, but that in severe or long-continued sickness they may throw them out, is supported by the conclusions of Basch and Weleminsky (*Archiv. für Hygiene*, vol. xxxv., p. 205), who experimented with a number of varieties of bacteria. They found that the milk of guinea-pigs infected with the organisms of typhoid fever, cholera, diphtheria, and anthrax was quite free from them, but that in local affections of the mammary glands *B. pyocyaneus* and *B. bovis morbificans* were found with regularity. With simultaneous infection by *B. bovis morbificans* and *B. anthracis* the latter were also found. That the milk of a tuberculous mother may be a source of infection for her child is shown by a case recorded by Roger and Garnier (*Comptes Rendus de la Société de Biologie*, March 2nd, 1900, vol. lii.). Four days after her confinement two guinea-pigs were inoculated with her milk; one died of tuberculosis, but the other, which received a smaller dose, showed no ill effects. Seventeen days after delivery the woman died with advanced pulmonary tuberculosis. Her child lost weight from birth, and died when six months old. Tubercular lesions of the mesenteric glands, liver, spleen, and kidneys were found, and in them the presence of the specific bacilli was demonstrated.—*Amer. Jour. Med. Sciences.*

OYSTERS AS A MEANS OF THE DIFFUSION OF ENTERIC FEVER.*

By PROFESSOR BORDONI-UFFREDUZZI AND DOCTOR C. ZENONI.

PROFESSOR BORDONI-UFFREDUZZI drew the attention of Italian authorities in 1898 to the risks of the spread of the infection of enteric fever by oysters, in consequence of certain facts observed by him in connection with the recrudescences of the disease in thickly-populated districts. For example, in 1897, just when the consumption of oysters was at its height, a number of cases of enteric fever occurred among the well-to-do classes in Milan. Four youths who had partaken freely of oysters at an 'oyster' supper were taken ill, and of these three died. Impressed by these facts, the Professor warned the public not to eat raw oysters. His advice gave rise to keen discussion, and was not generally acceptable.

The authors therefore decided to repeat some of the more important experiments to decide the question of the viability of the *Bacillus typhosus* both in sea-water and in the interior of the mollusc.

In Italy the principal centres for the production of oysters are Taranto, Venice, Spezia, and Lake Fusaro.

Dr. Cameron of Dublin, in 1880, was the first to suspect oysters of being a vehicle for the transmission of enteric fever. He noticed that in Dublin Bay there were large oyster-beds near to the outfall of the sewers and that these oysters were simply reeking with filth. But the first positive clinical observation of the transmission of the disease by oysters was published in 1894 by Professor Cohn, of the Wesleyan University of Connecticut. He published particulars of an outbreak which occurred among a number of students of that University, who had eaten oysters infected by sewage. After that reports of epidemics and of isolated cases due to oysters became numerous, as may be seen by consulting the results of the inquiry on the subject promoted by the *British Medical Journal*, and published in that Journal in 1896.

These observations placed beyond doubt the fact that oysters could be a means of the diffusion of enteric fever.

Some observers (Klein and Foote) found that the *Bacillus typhosus* had great vitality in sea-water and in the oyster itself, while others (De Giaksa, Sabatier, Du Camp, and Petit) came to an opposite

* Communicated to the Congress of Hygiene at Como, September 29th, 1899; translated and abstracted from *Giornale della Reale Società Italiana d'Igiene*.

conclusion. To place the matter beyond doubt, the following experiments were made:

Experiment 1.—Sea-water was sterilized by heat, and maintained at the temperature of the surrounding atmosphere ($\pm 15^{\circ}$ C.). A culture of the bacillus was added to the sea-water, together with albuminoid substances, such as blood-serum. From the water thus infected cultures in agar and in jelly were made daily. In these conditions the bacillus was found living at the end of a fortnight.

The same test was repeated with the water obtained from fresh oysters, in which the bacillus retained its virulence for three or four days.

Experiment 2.—Tubes of broth, prepared according to Parietti's formula, were inoculated with the liquid taken from the mantle cavities and with portions of the bodies of oysters sold in Milan, and brought from Venice, Spezia, and Taranto. In none of these cultures was the *Bacillus typhosus* found, but the virulent *Bacillus coli* was isolated from the water taken from the mantle cavity of all the oysters examined. Intra-peritoneal injections of the cultures killed the subjects of experiment.

Experiment 3.—Live oysters were planted in sea-water infected by cultures of the *Bacillus typhosus* after a preliminary sterilization. All the oysters were dead on the twelfth day. The bacillus was found alive in the water taken from the mantle cavities of these oysters up to the ninth day, but never in the body.

It is known that oysters can affect harmfully those partaking of them in various ways:

1. By giving rise to true enteric fever when they contain the specific bacillus;
2. By giving rise to acute gastro-enteritis, similar to cholera nostras, by means of some poison, which probably forms in the oyster after its death; and
3. According to Moore, there is a third form of illness produced by oysters, from special ptomaines, which is characterized by a continued fever, with profound depression, lasting for one or two weeks, and often terminating fatally.

Experiment 4.—To determine whether oysters undergoing simple decomposition were injurious to the consumer, aqueous extracts were made from fresh oysters and from oysters beginning to decay, by triturating them in a solution of common salt in sterilized receptacles. The triturated mass was kept in an ice-chest for twelve hours, and afterwards filtered.

The filtrate was injected into rabbits. The intra-venous injection

of the filtrate, both from the fresh and the decaying oysters, was fatal to the rabbit, though in the latter case death was more rapidly induced. The rabbits lost about a quarter of their weight.

Injection into the peritoneal cavity of the filtrate from putrid oysters was fatal in every case, but with the filtrate from fresh oysters a fatal issue resulted only after one out of every three injections.

These experiments prove that decaying oysters have an injurious effect on the animals subjected to experiment.

The authors conclude that their experiments fully establish the fact that oysters, in certain circumstances, may harbour the *Bacillus typhosus*, and thus be vehicles for the diffusion of enteric fever; and point out that while the bacillus was found in the water taken from the mantle cavity, it was never found in the mollusc itself.

VALUE OF CHLORINE FOR STREET-WATERING AND DISINFECTION.

The following report on this subject, issued from the Thompson-Yates Laboratories during last month, will be of interest to our readers:

"For the purposes of this report, which refers specially to the use of the two chemicals mentioned in street watering carts, *B. coli communis* has been chosen as the test-organism in pure culture, being the chief pathogenic bacillus usually present in wet mud, whilst experiments have also been done with the mud itself.

"Disinfection.—Taking a pure culture of *B. coli communis*, and using it in such proportion that about 100 organisms per c.c. were present, it was found that, after allowing the disinfectant to act for fifteen minutes,

Carbolated creosote, 1 in 2,500, no appreciable reduction.

" " " 1 in 5,000,

Chloros, 1 in 5,000, sterile; all organisms destroyed.

" " 1 in 10,000 " "

"Using a quantity of street mud diluted, the result was:

Carbolated creosote, 1 in 5,000, no reduction; innumerable colonies.
Chloros, 1 in 10,000, nearly sterile; only nine colonies.

"Deodorization.—Whilst in a dilution of 1 in 100 the creosote shows a marked superiority over chloros for deodorizing faeces and other strong-smelling substances, this advantage entirely disappears when the dilution is carried to 1 in 2,500, and creosote gives no better deodorizing results in this dilution than chloros in 1 in 5,000. Having regard, therefore, to the better disinfecting properties of chloros, and the failure of both to deodorize, chloros is superior for use in the street watercarts."

In view of the prevalence of diarrhoea and other summer diseases from which many areas suffer, a systematic use of "Chloros" might have good results.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

ANNUAL PROVINCIAL MEETING.

THE annual provincial meeting of the Society was held in the Royal Pavilion, Brighton, on Saturday, June 30th, 1900. Present: The President (Dr. A. Newsholme), in the Chair; Drs. Shirley F. Murphy, E. Gwynn, F. J. Allan, Reginald Dudfield, C. Childs, W. H. Symons, W. R. C. Middleton (Singapore), E. B. Fuller (Cape Town), J. M. Martin, W. J. Simpson, W. Collingridge, H. G. Felkin, H. Beale Collins, J. Groves, A. Griffith, H. Kenwood, C. Renney, J. Scott Tew, G. Millson, W. A. Bond, Oliver Field, J. Priestley, A. Bostock Hill, Louis Parkes, A. Wynter Blyth, and Mr. Wolf Defries, Members of the Society; Sir Joseph Ewart, and Drs. A. E. Carruthers, S. Gibbon, J. T. C. Nash, Messrs. G. P. Rugg, W. F. Knight, Mr. Councillor Hollis, Visitors. The following ladies were also present: The Mayoress of Brighton, Mrs. Newsholme, Mrs. Gwynn, Mrs. S. F. Murphy, Mrs. Wynter Blyth, Mrs. Collingridge, Mrs. Allan, Mrs. Reginald Dudfield, Mrs. Louis Parkes, Mrs. Millson, Mrs. Nash, Mrs. Priestley, Mrs. Tillstone, Miss Hollis, and Mrs. Tew. Apologies for absence were read from Dr. McVail (the President-elect), Professor Corfield, Dr. T. O. Dudfield, Dr. Woodforde, and many others.

MINUTES.—The minutes of the last provincial meeting were read, approved, and signed by the President.

CORRESPONDENCE.—The Hon. Secretary read letters from Dr. Thos. Borthwick and Dr. W. J. Gregerson, announcing the formation of a South Australian Branch, and intimating that Dr. Borthwick of Adelaide had been elected first President of the Branch, and Dr. W. J. Gregerson Hon. Secretary.

Resolved unanimously that the best thanks of the Society be accorded to Dr. Borthwick for the great trouble he has taken in the formation of the Branch.

Letters were also read—

From Mr. George King, F.I.A., acknowledging the vote of thanks accorded to him at the last ordinary meeting of the Council;

Ordered to be noted.

From the Royal Statistical Society, submitting particulars of the competition for the Howard Medal, 1901; Referred to the Editor.

From the Royal College of Physicians, submitting particulars of the Rogers Prize; Referred to the Editor.

From the Royal Medical Benevolent College, asking for a donation towards the funds.

Resolved that, the Society having no funds at its disposal for the purpose, no action be taken.

REPORT OF PARLIAMENTARY COMMITTEE.—The Hon. SECRETARY read the following report of Parliamentary Committee:

Your Committee beg to report:

1. That they have considered the Housing of the Working Classes (Rural Districts) Bill, and recommend that no action be taken thereon at present.

2. That they have further considered the Midwives Bill as amended by the Standing Committee on Law, and are of opinion that the Bill now before the House of Commons does not adequately protect the interests of the community, and they recommend the Society to support the amendments suggested by the Council of the British Medical Association, and to oppose the Bill unless the same are embodied therein.

3. That it has come to their knowledge that medical officers of health are being asked to sign petitions in favour of the Midwives Bill, and they recommend that caution should be exercised in dealing with applications of this nature.

4. That they have considered the Water-supply Bill, and recommend the Society to approve the principle of the Bill, and to suggest that provision should be made in the Bill (1) requiring companies to see that no dead ends exist to supply pipes; and (2) placing some limit on the hardness of water.

Resolved, on the motion of Dr. GROVES, that the report be received and adopted.

ELECTIONS.—A number of candidates were then nominated for election at the next meeting.

The PRESIDENT (Dr. A. Newsholme) then gave a short demonstration of some details of local administration.*

At the close of the President's address, Dr. COLLINGRIDGE moved that a cordial vote of thanks be given to the President for his interesting and instructive paper. The various systems which Dr. Newsholme had placed before the meeting appeared to work very well, but they could not overlook the fact that an immense amount of labour and energy had been expended on details of administration before the efficiency demonstrated to them that day had been secured. Dr. Newsholme was to be congratulated for having developed his work far in advance of the systems in vogue in most towns. The notification of phthisis, while of great value for statistical purposes, was of still more importance for working out the history of the spread and infection of the disease. Nearly all the work done up to the present time had been in relation to deaths from the disease, but with its notification in the earlier stages opportunities were afforded of obtaining information of immense value.

The motion was seconded by Dr. SCOTT TEW, and carried unanimously.

The PRESIDENT acknowledged the vote of thanks.

THANKS TO THE CORPORATION.—Dr. MURPHY moved that the cordial thanks of the Society be accorded to the Mayor and Corporation of Brighton for their kindness in permitting the meeting of the Society to be held in the Royal Pavilion, and for throwing open the Sanatorium for inspection by the Society. The Society was very grateful, because Brighton presented many features of interest to medical officers of health. For the proper discharge of public health work, a capable medical officer of health and an efficient sanitary authority were requisite; Brighton possessed both.

Dr. GROVES seconded the motion, which was carried unanimously.

Sir JOSEPH EWART, in responding to the vote of thanks on behalf of the Corporation, said the words that had fallen from previous speakers

* Will be published in a future issue.

showed that Brighton had for a long time done its utmost to promote the sanitary interests of the town. Brighton was fortunate in its position, which was satisfactory in almost every respect. They had also, as their health officer had proved to their satisfaction, a considerable share of sunshine. Another advantage they enjoyed was an eminently satisfactory railway system. He approved very highly of the remarks of the proposer of the resolution. They had a health officer who was not only eminently qualified for the work, but was always at it with a very large amount of unexhausted energy, a work he hoped he might be long spared to continue. The Corporation had for the last twenty or thirty years been entirely in sympathy with the advancement of every branch of sanitation, whilst the Board and Voluntary Elementary Schools all endeavoured to help the health officer to the utmost of their power, and they were glad to know that the health officer had it in his power to be of some pecuniary assistance to the local educational authorities. He had much pleasure in accepting the vote of thanks, which he would convey to the Mayor and Corporation.

Resolved unanimously that a cordial vote of thanks be given to the Southern Branch of the Society for their courteous hospitality.

At the conclusion of the meeting, the members and friends partook of lunch, which was served in the Royal Pavilion. One toast, "The Queen," proposed by the PRESIDENT, was heartily responded to.

In the afternoon the party drove over the Downs to the Sanatorium, where tea was kindly provided by Mr. Councillor Hollis, Chairman of the Sanitary Committee. After inspecting the Sanatorium, the public abattoir, and the destructor, a cordial vote of thanks to Mr. Hollis was passed on the motion of Dr. GWYNN, seconded by Professor WYNTER BLYTH.

Metropolitan Branch.—The annual meeting of this Branch was held at No. 197, High Holborn, W.C., on Friday, July 13th, 1900. Present: Dr. Dixon (President), in the Chair; Dr. A. Newsholme (President of the Society); Drs. E. Gwynn, S. R. Lovett, G. Millson, F. J. Allan, J. Priestley, S. Davies, L. T. F. Bryett, R. Dudfield, W. R. Smith, and Oliver Field (Hon. Secretary).

MINUTES.—The minutes of the last meeting of the Branch were read, approved, and signed by the President.

The HON. SECRETARY reported that he had communicated the resolution passed at the last meeting to Mrs. Glaister, and read her reply thanking the Branch for their sympathy.

ELECTION OF OFFICERS.—This being the annual meeting of the Branch, the election of President, Officers, Council, and Representatives on the Council of the Society was proceeded with.

The HON. SECRETARY reported that the following Fellows had been duly nominated:

President.

FRANCIS J. ALLAN, M.D.

Vice-Presidents.

J. DIXON, M.D.

JOHN F. J. SYKES, M.D., D.Sc.

Hon. Treasurer.

H. W. ROBERTS, M.R.C.S.

Hon. Secretary.

OLIVER FIELD, M.D.

Representatives on Council of Society.

S. DAVIES, M.D.	G. MILLSON, L.R.C.P.	H. W. ROBERTS, M.R.C.S.
J. DIXON, M.D.	LOUIS PARKES, M.D.	J. F. J. SYKES, M.D.
O. FIELD, M.D.	J. PRIESTLEY, M.D.	E. G. YARROW, M.D.

Council of Branch.

All the above, and R. DUDFIELD, M.B., E. GWYNN, M.D., and S. R. LOVETT, L.R.C.P.

Whereupon it was resolved unanimously "that the foregoing Fellows be, and they are hereby respectively, elected President, Officers, and Council of the Branch, and Representatives of the Branch on the Council of the Society, for the ensuing year."

"DIARRHOEA" CLASSIFICATION.—The Branch then proceeded to consider the letter from the Hon. Secretary of the Incorporated Society drawing attention to the report submitted to a special meeting of the Council on May 11th last on the subject of the "Certification and Classification of 'Diarrhoea' Deaths," and intimating that the Council referred the same to the Branches for their observations, and asking whether the Branch would be prepared to make a contribution towards the cost of carrying out the first recommendation in the report (*i.e.*, to forward a circular to every medical practitioner in the United Kingdom), or as an alternative to undertake the distribution of such circulars to medical practitioners in their district.

The Hon. SECRETARY read the letter referred to, and stated that the report in question had been published in the June issue of PUBLIC HEALTH, a copy of which he laid before the Branch.

After discussion, it was moved by Dr. ALLAN, and seconded by Dr. MILLSON, that, providing the Society do supply the necessary number of copies of the circular referred to, the Branch undertake to distribute the same to medical officers of health in the County of London, and request them to circulate the same amongst the medical practitioners in their districts.

To which an amendment was moved by Dr. FIELD, and seconded by Dr. R. DUDFIELD, that the Branch was prepared to undertake to circulate the communication referred to to all medical practitioners in the County of London.

The amendment was negatived by the meeting.

A further amendment was moved by Dr. R. DUDFIELD, and seconded by Dr. FIELD, that the Society be informed that the Branch is willing to contribute a sum of £10 towards the expense of circulating the report, etc.

The PRESIDENT put the amendment, and declared the same to be carried, and, on its being put as a substantive motion, it was resolved accordingly.

The original motion was therefore not put.

LOCAL GOVERNMENT ACT, 1899.—Dr. R. DUDFIELD drew attention to the powers and duties to be transferred from the London County Council to the new London boroughs, and suggested the desirability of a small committee being appointed to consider the same.

After discussion, it was resolved that it be referred to the Council to consider the powers and duties to be transferred from the London County Council to the new London Borough Councils under the

London Government Act, 1899, with a view to securing uniformity of action.

VOTE OF THANKS.—On the motion of Dr. LOVETT, seconded by Dr. DAVIES, it was unanimously resolved that the cordial thanks of the Branch be offered to Dr. Dixon for the able and courteous manner in which he has presided over the meetings of the Branch during the past year.

North-Western Branch.—The ordinary monthly meeting of the Branch was held at the rooms of the Chemical Club, Manchester, on July 13th. The following members were present: Drs. Sergeant (in the Chair), Berry, Brindley, Edlin, Garstang, Guest, Gornall, Graham, Martin, Wheatley, and Meredith Young.

Letters were read from Drs. Kenyon, Robertson, and Hayward.

The report of the committee nominating the office-bearers and committee was confirmed.

The following were the office-bearers elected:

President: DR. PORTER.

Vice-President: DR. GARSTANG.

Treasurer: DR. MEREDITH YOUNG.

Librarian: DR. TATTERSALL.

Secretary: DR. WHEATLEY.

Representatives of the Branch on the Council of the Society: Drs. SERGEANT and ROBERTSON.

The Branch then considered the report on the "Nomenclature of Diarrhoea" laid before the Council of the Society, and resolved that it was very desirable that uniformity in certification of diarrhoea deaths should be obtained, and that for this purpose a circular should be sent to every medical practitioner in the country embodying the report of the College of Physicians. A sum of £5 was voted by the Branch towards the cost of sending out the circulars if it is decided to do so.

Dr. A. W. MARTIN then read a paper on "Modes of Living in Relation to Disease."

An interesting discussion followed.

Yorkshire Branch.—The annual meeting of the Yorkshire Branch of the Incorporated Society of Medical Officers of Health was held at the Town Hall, Wakefield, on Thursday, July 5th, 1900, when the following members were present: T. B. Fairclough (President), J. Buck, J. Spottis-woode Cameron, W. Arnold Evans, B. G. Ewing, R. Forsyth, T. A. Green, G. Spencer Greenwood, J. Hargreaves, G. B. Hillman, B. Kemp, F. W. Martin, G. H. Moorhead, A. E. Sellers, F. A. Storr, W. S. Wade, R. E. Williamson, J. Mitchell Wilson, and J. R. Kaye (Hon. Secretary). The following were also present as visitors: Drs. W. Roulston and W. K. Clayton (Wakefield); also his Worship the Mayor (Alderman Barron Kilner) and the Town Clerk (Mr. C. J. Hudson).

The minutes of the last meeting were approved. The Branch was gratified with the report of the annual dinner, on May 31st last, which was a great success.

Dr. G. Tait, Medical Officer of Health for Whitley Upper, was elected a member of the Branch.

The Hon. SECRETARY gave the outlines of the annual report for the session 1899-1900, which had previously been submitted to the Council.

The report was ordered to be printed and circulated.

The Branch heard with regret of the decease of two prominent members (Drs. Ainley and Ramsden), and unanimously passed the following votes of condolence:

"That the members of the Yorkshire Branch of the Incorporated Society of Medical Officers of Health do express their profound regret at the death of Dr. D. Ainley, and do place on record their appreciation of his long and valuable work in the public health service. Also that a message of heartfelt sympathy and condolence be sent from the Branch to Mrs. Ainley and the family in their bereavement."

A resolution in similar terms was adopted with reference to the death of Dr. W. H. F. Ramsden.

The election of officers for the ensuing session 1900-1901 resulted as follows:

President.

W. L. HUNTER, M.D., D.P.H., Pudsey.

Vice Presidents.

THOMAS JOHNSTONE, M.D., Ilkley.

E. G. ANNIS, M.R.C.S., L.R.C.P., Huddersfield.

J. MITCHELL WILSON, M.D., D.P.H., Doncaster.

T. FAIRCLOUGH, L.R.C.P., Mirfield.

Council.

F. E. ATKINSON, L.R.C.P.

J. H. BUCHANAN, M.D.

J. SPOTTISWOODE CAMERON, M.D.

W. A. EVANS, M.D., D.P.H.

R. FORSYTH, M.D.

T. H. LITTLEJOHN, M.B., D.P.H.

F. W. MARTIN, M.R.C.S.

J. W. MASON, M.B., D.P.H.

A. ROBINSON, M.D.

W. SCATTERTY, M.D.

E. SMITH, M.D., D.P.H.

F. A. STORR, D.P.H.

J. A. ERSKINE STUART, L.R.C.P.

W. F. WATTS, M.R.C.S.

E. D. WELLBURN, L.R.C.P.

Representatives on the Council of the Incorporated Society.

J. MITCHELL WILSON, M.D., D.P.H.

W. L. HUNTER, M.D., D.P.H., President.

J. R. KAYE, M.B., D.P.H., Hon. Secretary.

The retiring President, Dr. T. B. FAIRCLOUGH, then delivered his Annual Address, which had been deferred from previous meetings. In it he gave a short history of the progress of sanitation during thirty years, and he showed, by reference to his own district (Mirfield), the improvements that had taken place in recent years, and their influence upon the vital statistics. He was cordially thanked for his interesting paper, and it was hoped that members would have the pleasure of reading it in the pages of PUBLIC HEALTH.*

At this stage the meeting adjourned in order to visit the new Acute Hospital at the West Riding Asylum, over which Dr. Bevan Lewis, the Medical Superintendent, kindly conducted the party. Great interest was shown in the plenum system of ventilation, and various up-to-date arrangements and scientific apparatus exhibited by Dr. Lewis.

On returning to the Town Hall, his Worship the Mayor entertained the Branch to tea, after which Dr. Cameron exhibited two photographic enlargements showing a grossly defective drain which had been dis-

* Will be published in a future issue.

covered in the course of alterations for converting the Killingbeck Hall into a temporary hospital. Dr. Cameron showed how the 4-inch, 6-inch, and 8-inch pipes alternated in the course of a short drain with open joints and improper angles and levels, and explained that a now disused well in close proximity once afforded the water-supply.

CERTIFICATION AND CLASSIFICATION OF "DIARRHŒA" DEATHS.—The Hon. SECRETARY introduced an important discussion by reading a letter from the Incorporated Society, dated June 1st, 1900, requesting the Branch to consider the reports on this subject.* The Society desired to have an expression of opinion from the Branch on the proposals of the Royal College of Physicians with regard to diarrhœa nomenclature, and also to know whether the Branch would be willing to make a contribution towards the cost of circularizing all general practitioners, with a view to securing the more careful certification of diarrhœa, and the entire disuse as synonyms of epidemic diarrhœa in death certificates of such terms as "gastro-enteritis," "muco-enteritis," or "gastric catarrh."

After some discussion, it was proposed by Dr. J. R. KAYE, and seconded by Dr. J. MITCHELL WILSON—

"That the Incorporated Society be informed that the Yorkshire Branch is unable to contribute to the cost of issuing the proposed circulars to medical practitioners *re* the classification of diarrhœa deaths."

This was carried.

While there was a general agreement that the present variety of custom among medical practitioners was confusing, members were not clear as to the best method of obtaining improvement.

Dr. KAYE suggested that, although the Branch could not see their way to contribute to the circular, perhaps if members were supplied with a number of copies they would each undertake their distribution among medical practitioners.

Dr. CAMERON urged that it was hopeless to attempt to get all medical practitioners throughout the country to adopt a uniform classification. He therefore moved—

"That it is the opinion of the Yorkshire Branch that the medical officers of health themselves should formulate the list of diseases which they intend to include under 'diarrhœa,' and should so include them rather than ask the general practitioners to abide by any special system of nomenclature."

He maintained that each medical officer of health, in allocating his diarrhœa death certificates, ought to take into consideration the particular views and custom of the certifying practitioner, and classify the death according to his discretion. This process would always be necessary, and in Dr. Cameron's opinion the best results would come from agreement among medical officers of health rather than attempting to bring the enormously larger body of medical practitioners into narrow lines.

Dr. B. KEMP seconded Dr. Cameron's motion.

Dr. J. MITCHELL WILSON then proposed the following amendment:

"That the Yorkshire Branch accepts the proposal that has come to us from the Incorporated Society, and that we do send out to the medical practitioners such a circular as a guide in certifying deaths from diarrhœa."

* See pp. 683-691 of the June number of PUBLIC HEALTH.

Dr. Wilson said that, in his opinion, the general practitioners throughout this country were a body of scientific men who could be relied upon to do all in their power to carry out any suggestion coming to them with the force with which he thought it would come from the Society of Medical Officers of Health and the Royal College of Physicians.

Dr. J. R. KAYE seconded the amendment. He said the present position of diarrhoea deaths in statistics was one of the utmost confusion. This arose firstly because of the large number of synonyms adopted by the general practitioners according to fashion or fancy, rendering the classifying of deaths a difficult matter for the medical officer of health or the registrar of deaths. In one district in his knowledge, with a population of 40,000 persons, only eighteen deaths were classified as diarrhoea, whereas in another district of 13,000 there were thirty-seven deaths ascribed to that disease. This was due to the caprice of the medical officer of health in the former, who excluded all deaths save those definitely assigned to diarrhoea. Surely such chaos required rectification, and Dr. Kaye could not help thinking it was best to begin at the root of the disorder, and request the general practitioners to conform to some simpler nomenclature.

Dr. G. H. MOORHEAD supported the amendment, and drew attention to the relative importance of diarrhoea when placed first or second on the death certificate.

Dr. G. B. HILLMAN supported Dr. Cameron's original motion. He thought with him that the medical practitioners, being so large a body, would always pursue a variety of lines, while the medical officers of health might agree among themselves how to assort the returns.

Dr. ARNOLD EVANS stated that, whatever the result of this discussion, he had determined for himself to try the experiment of circularizing all the medical practitioners of Bradford on the lines proposed, and he hoped it would be successful.

Dr. B. G. EWING asked Dr. Cameron whether, under his system, it would be left to the medical officer of health to decide from a certificate when any action was called for by the sanitary inspector.

Dr. CAMERON replied that that was so under the present conditions, and would necessarily remain so.

Dr. FAIRCLOUGH thought that many practitioners objected to use the simple term "diarrhoea," because parents would regard that as easily curable, and would discredit the doctor for his non-success in dealing with it. Dr. Fairclough drew attention to the fact that several who had taken part in the discussion had left to catch their trains, and he suggested that it would perhaps not be fair to put the amendment and motion to the vote.

Ultimately it was decided to adjourn the discussion to the next meeting, but the Hon. Secretary was empowered, as the Representative of the Branch, to intimate the tone of the meeting to the Incorporated Society, and make reference to Dr. Cameron's motion and the amendment thereon.

The meeting terminated with a vote of thanks to the Mayor and Corporation of Wakefield.

West of England and South-Western Branch.—A meeting of the Branch was held on July 5th at the rooms of the Cardiff Medical Society. Present: Drs. Symons (President), D. S. Davies, Walford, Prichard, J. Howard Jones, Tubb-Thomas, Williams, Herbert Jones,

Randall, Ebenezer Davies, and Heaven, Members of the Branch, and Dr. Savage, a Visitor.

The minutes of the last meeting were read and confirmed.

A letter from the Secretary of the Society acknowledging receipt of the copy of the resolution adopted by the Branch *re* distribution of diphtheria antitoxin was read; also a letter from the Clerk of the Society announcing the resignation of Dr. W. Dyne Steele, the affiliation to the Branch of Drs. Streeten of Swindon and Waylen of Devizes, and the nonpayment of subscriptions by certain members. On the question of non-payment by members of current subscriptions, it was proposed by Dr. D. S. DAVIES, seconded by Dr. E. DAVIES, and resolved:

"That it be an instruction to the Secretary of the Branch to send a circular to every member on May 1st of each year, calling attention to the fact that if subscriptions are not paid by June 30th the Branch will lose the money-grant for each member in default."

Dr. HERBERT JONES announced that Dr. J. R. Essex, Pontypool; Dr. Browne, Tredegar; Dr. Evans, Mountain Ash; and Dr. Hemming, Abergwynfi, had been nominated for election. Dr. J. M. Martin, Stroud (already a member of the Society) was elected a member of the Branch.

The next business was the election of the President for 1900-01, and the PRESIDENT (Dr. Symons) proposed Dr. Herbert Jones, Pentre, for that office. The proposition was seconded by Dr. D. S. DAVIES, and carried unanimously.

The election of representatives of the Branch on the Council of the Incorporated Society was then proceeded with, and Drs. J. Howard Jones and J. C. Heaven were re-elected. Dr. J. C. Heaven was unanimously elected Secretary and Treasurer for the year 1900-01.

The meeting considered a letter from the Society with reference to the distribution of a circular to all medical practitioners calling attention to the importance of careful certification of "diarrhoea" deaths. Considerable discussion ensued as to the proper channel through which the circular should issue, individual sanitary authorities, the several County Councils, and the Registrar-General being each considered the best channel by various members.

Dr. EBENEZER DAVIES proposed:

"That this Branch guarantee the sum of £10 towards the distribution by the Society of Medical Officers of Health."

This was seconded by Dr. PRICHARD, but was lost on being put to the meeting.

After further discussion, the following resolution was proposed by Dr. EBENEZER DAVIES, seconded by Dr. TUBB-THOMAS, and carried *nem. con.*:

"That this Branch suggests for the consideration of the Council of the Incorporated Society the desirability of memorializing the Registrar-General, in order to secure an official notice to the members of the profession embodying the recommendations of the College of Physicians in regard to the classification of cases of epidemic diarrhoea."

Dr. HERBERT JONES then brought before the meeting some points with regard to cellar dwellings, producing plans of certain kinds of

buildings in which rooms might or might not be considered as cellars.* Discussion on the points involved ensued, and Dr. Jones was thanked for bringing the matter before the meeting.

Home Counties Branch.—The annual meeting of this Branch was held at the Holborn Restaurant on Thursday, July 12th, 1900. There were present: Dr. Tew (President) in the Chair, and Drs. Woodforde, Gruggen, Sharman, Beaumont, Thresh, Kenwood, Foulerton, Skinner, Richards, Ashby, and Shadwell.

The minutes of the meeting of April 26th, and of the special meeting of May 9th, were read and confirmed.

A letter expressing inability to be present was received from Dr. Seaton.

"DIARRHŒA" CLASSIFICATION.—A letter, dated June 1st, 1900, from the Hon. Secretary of the Society *re* report of meeting of Council on the "Classification, etc., of Deaths from 'Diarrhœa'" was read.

It was proposed by Dr. THRESH, seconded by Dr. KENWOOD, and resolved:

"That the Secretary of the Branch be instructed to write to the Council of the Society, and say that this Branch is glad to know that the Council is moving in this matter, and will be glad to receive as early as possible the result of the application to the other Branches."

Dr. ASHBY asked to be allowed to obtain 150 copies of the last report of the special committee on the "Classification and Certification of Deaths from 'Diarrhœa,'" and 200 copies of his original paper on the same subject, and that these, together with reprints of the first report, be sent to all the teachers of hygiene in the United Kingdom.

Proposed by Dr. THRESH, seconded by Dr. KENWOOD, and carried:

"That the necessary number of reprints asked for by Dr. Ashby be obtained and sent to the teachers of hygiene as suggested, and that the expense of obtaining and sending out the reprints be borne by the Branch."

DAY OF MEETING.—The question then came up as to the most convenient day for holding the meetings of the Branch.

A note was read from Dr. Beale Collins suggesting Monday as the most convenient day.

An opinion of the meeting was taken, when it was found that the majority were in favour of the meetings being held, as heretofore, on the second Thursday in the month.

ELECTION OF OFFICERS.—The meeting then proceeded to the election of officers.

Proposed by Dr. ASHBY, seconded by Dr. WOODFORDE, and unanimously resolved, that Dr. Kenwood be President during the ensuing year.

Dr. Ashby was next unanimously reappointed Treasurer.

On the proposition of Dr. SHADWELL, seconded by Dr. KENWOOD, Dr. H. Meredith Richards was unanimously elected Hon. Secretary.

Drs. Ashby and Richards were appointed Representatives to serve on the Council of the Society.

* Will be published in a future issue.

THE RECENT DISCOVERY OF ARSENIC IN PHOSPHATE OF SODA.

EARLY in April this year Dr. Miles Miley, of Belsize Avenue, was called to a patient suffering from mild diarrhœa and sickness, who had taken, *inter alia*, part of a teaspoonful of effervescent phosphate of soda. In the middle of April Dr. Miley attended a nurse suffering from what seemed an obstinate bilious attack. She had taken only a teaspoonful of the same drug. About three weeks afterwards this patient administered a teaspoonful of the same phosphate of soda to a boy of eight years. Such violent purging and sickness resulted, that Dr. Miley submitted the drug to Mr. A. W. Stokes, Public Analyst to Paddington and Hampstead, who found that it contained a preparation of arsenic equivalent to $2\frac{3}{8}$ per cent. of arsenic calculated as white arsenic (As_2O_3). In the beginning of June Dr. Miley was telegraphed for by a patient who he knew occasionally took this drug. The patient—a female—was in a very critical state when first seen, presenting symptoms of arsenical poisoning; but had she been the first instead of the last of the series who took effervescent phosphate of soda the diagnosis might have been made only at the post-mortem. Recovery was not complete at the expiration of six weeks. Mr. Stokes found in the drug taken by the last patient a preparation of arsenic equivalent to $2\frac{3}{8}$ per cent. of arsenic, calculated as white arsenic, or 161 grains to the pound. In the thirty-six hours before Dr. Miley saw this patient she had taken three doses, containing a total of about 8 grains of arsenic, the last dose being taken some five hours before medical assistance was summoned.

Some of these facts having come to the knowledge of Dr. Reginald Dudfield, the Medical Officer of Health of Paddington, he caused thirteen samples of the drug to be purchased from druggists in his district. These were examined by Mr. Stokes, who found nine of them to be free from arsenic, two to contain mere traces of arsenic, and two others to contain arsenic to the extent of $3\frac{1}{2}$ and $8\frac{1}{2}$ grains to the pound respectively.

The vendors of the last two samples were prosecuted at the Marylebone Police Court on July 5th.

Mr. Stokes detailed the method of analysis used and the results found. He emphatically stated that though arsenic might occasionally be present as an impurity (through neglecting the B.P.'s warning not to use impure ingredients), yet he thought that in these

cases the arsenic was added by a mistake in the form of arsenate of soda. Trade rumours were current to that effect.

The defendants called expert witnesses, who stated that every sample of phosphate of soda they had examined contained some arsenic, but that its presence was previously unsuspected till now pointed out. The arsenic was said to be due to the use of impure sulphuric acid in the manufacture of the phosphate of soda, which forms about one-third of the weight of the effervescent drug. It was also urged in defence that while the British Pharmacopœia usually indicates every impurity which may possibly be present in a drug, it does not do so in the case of effervescent phosphate of soda. It does, however, warn the manufacturer, when speaking of some of the constituents, such as sulphuric acid, that arsenic might be present.

After a week's consideration the magistrate, Mr. Plowden, fined each vendor £10 and £5 5s. costs.

So far as the evidence gathered goes, it appears that the phosphate of soda in some of these cases came from Germany in a crude state. Some wholesale druggists in England refine it solely by dissolving the phosphate, straining off any dirt, and recrystallizing to eliminate any carbonates or chlorides. Arsenate of soda, if any were present, being isomorphous with phosphate of soda, would be still retained. Evidence was given by an English refiner that no attempt to get rid of arsenic was made, its presence not having been suspected.

If arsenic be so universally present in phosphate of soda, it is strange that no one discovered it until samples containing over 2 per cent. have been met with in one medical man's practice, and that no accidents have arisen from its use till now. It is quite inexplicable that as a mere impurity it could be present to the large extent found in Dr. Miley's samples. His worst sample contained the equivalent of 161 grains of white arsenic to the pound of effervescent phosphate, or about 483 grains of arsenic to the pound of phosphate of soda. It is hard to believe that this quantity could be present as a mere impurity. Nor does the difficulty end there—the effervescent drug is composed of large and small granules. When the drug is shaken the larger granules come to the top, and, unless special care were taken, this part, being at the top of the vessel containing the drug, would be used first, leaving the finer particles for the last doses. Mr. Stokes found that the larger granules of one sample (averaging $8\frac{1}{2}$ grains to the lb.) contained arsenic in the proportion of $6\frac{1}{2}$ grains per lb., and the smaller granules $25\frac{1}{4}$ grains of arsenic per lb., showing that the mixture

was not homogeneous. Evidently anyone taking the last portion of this bottle might take a possibly fatal dose.

The B.P. doses that might have been taken from the samples for which prosecutions were instituted would, if the substance were properly mixed, include in the one case twice, and in the other four times, as much as the maximum dose of arsenic prescribed by the Pharmacopœia. The statement that all phosphate of soda contains arsenic cannot be accepted, as one firm, at least, makes an article guaranteed free from arsenic.

Had pure chemicals been used arsenic would not have been present in phosphate of soda. The omission of any mention in the Pharmacopœia of arsenic as a possible impurity does not relieve the manufacturer from taking ordinary precautions, or from applying tests as to the absence of any injurious ingredients—tests which should be applied to all drugs, whether the B.P. prescribes them or not.

If such tests be not applied to the finished products, the fact that impure constituents have been used, or that an accidental admixture of some other drug has taken place, will escape observation, and awkward results may follow, as in this case. Two substances exactly alike in appearance, such as phosphate and arsenate of soda, may by carelessness get mixed (as it is asserted they did in this instance) without any chance of detection.

In regard to the tests to be used, some writers now suggest that the Pharmacopœial test for arsenic in glycerine should be used. This test depends upon the discolouration of a piece of filter-paper treated with mercuric chloride. Unfortunately, this test might be vitiated by the presence of traces of sulphur compounds, and false deductions might arise in qualitative testing. Quantitatively it is not reliable. Marsh's test qualitatively, and precipitation as sulphide for quantitative purposes, though slow, leave little to be desired.

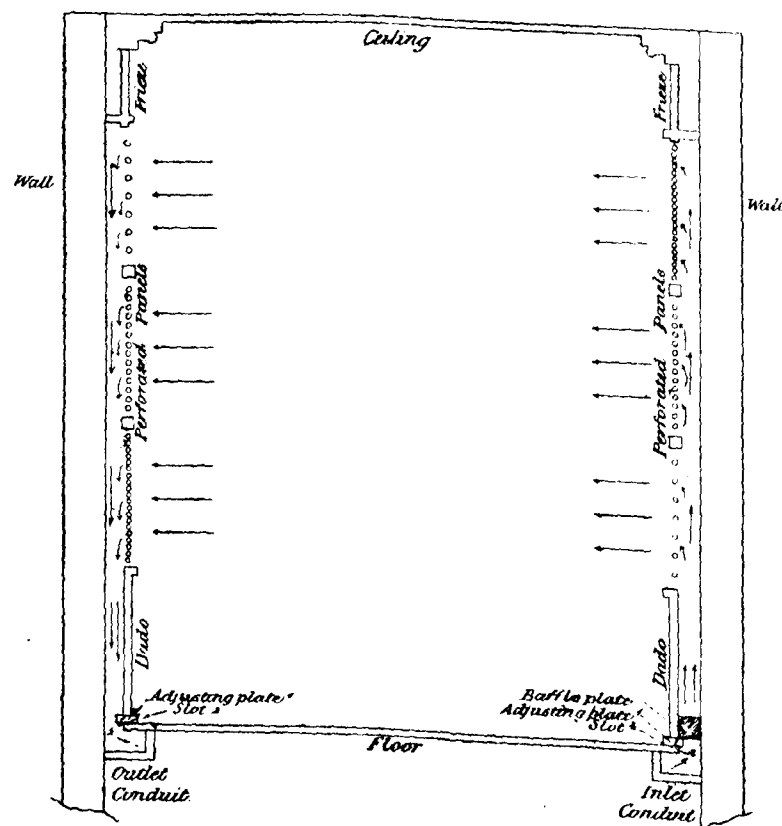
LYON-CADETT SYSTEM OF DRAUGHTLESS VENTILATION.*

THE special features of this invention are extensive inlets and outlets, by means of which a very large quantity of air, without draughts, can be conveyed to all parts of crowded places, and efficient ventilation provided with a very small allowance of air-space. This is accomplished by a new manner of employing the momentum and pressure of air.

* The system was demonstrated by means of a model at the meeting of the Incorporated Society of Medical Officers of Health in March last.

Inlets.—Fresh air is forced along a conduit by a fan, and passes out along one side of the conduit through a tapering longitudinal slot broadest at the inlet end. The air is then passed into the room through perforated screens of variable closeness. The air issues evenly all along the slot, because the momentum of air as it passes along the conduit is converted into pressure, the air tending to heap up towards the closed end, and so the greatest pressure of air corresponds to the narrowest part of the slot. On the same principle the meshes of the screens are

Lyon-Cadett System of Draughtless Ventilation.



DIAGRAMMATIC SECTION.

largest nearest the conduit. By these means air is caused to issue nearly evenly from all parts of the screens.

A stream of air running along a conduit is converted into a volume of air flowing at a greatly reduced speed into a room.

Outlets.—The foul air is passed through extensive outlets in a similar manner into a conduit, and conveyed away. The outlet slot is narrowest at the end from which the air passes away. The screens with the widest meshes are furthest from the conduit, and no baffle plates are necessary.

The conduits may be used without the screens, and the inlets and outlets may be placed at any position required. The plenum or

vacuum systems may be used, or, preferably, a combination of both. By employing blowers to force in the air, and exhausts to draw it off, complete control of inlet and outlet is maintained without closing windows or doors, and open fireplaces can be used. Provision is made for thoroughly cleansing all the air-passages, and the air may be filtered, heated, or cooled, and so maintained fresh, free from fog, at any temperature desired all through the year.

Example.—The capacity of a room 50 feet long, 30 feet broad, and 20 feet high, is 30,000 cubic feet, or 300 cubic feet per head for 100 persons. If now we change the air in such a room ten times an hour, or once in six minutes, we shall supply 3,000 cubic feet to each person. Supposing we make the inlets and outlets in opposite side-walls of the room, equal in area to a quarter these walls, the air will pass across the room in six minutes, or 1 inch a second, and consequently through the inlets and outlets at 4 inches a second. Good draughtless ventilation has been effected with only 300 cubic feet of air-space per head.

REVIEW OF RECENT BACTERIOLOGY.

THE DESTRUCTION OF RATS BY MEANS OF BACTERIA.—Löffler has already advised the destruction of field-mice (*M. arvicola*) by means of cultures of *Bacillus typhi murium* mixed with food, and the method has been carried out on a practical scale with some success. Danysz* has used cultures of another species of bacillus in a similar way for the destruction of rats in the public sewers in Paris. The bacillus employed is one which Danysz isolated in investigating a spontaneous epidemic which occurred in field-mice. When freshly isolated, the organism was pathogenic to a certain degree for gray rats (*M. decumanus*), killing about two or three out of every ten animals inoculated. It was found possible by artificial means to increase the virulence for rats to a much higher degree. The method employed for exalting and fixing the virulence was as follows: A mouse was first killed by an ordinary inoculation, broth cultures from the mouse were then enclosed in collodion capsules, which were kept in the peritoneal cavity of a living rat for thirty-six hours. At the end of that time a subculture was made in broth, and then passed through another mouse. This process having been repeated four or five times, the culture was passed first through the more susceptible young rats, and then through adult animals. In the end, a culture highly pathogenic for both the gray rat and the black rat (*M. rutilus*) was obtained. Pieces of bread soaked in broth cultures of the bacillus were then laid down in the sewers, and by this means large numbers of the rats were killed.

CASES OF PYOCYANEUS INFECTION.—Charrin and Legros† record the case of a woman, aged forty, who miscarried in the seventh month of pregnancy, and in whom symptoms of septicaemia appeared fourteen days afterwards. Diarrhoea was present, and the green colour of the stools attracted attention. From the stools *Bacillus pyocyaneus* was isolated and identified in the usual way. The same bacillus was isolated in pure culture from urine drawn off the bladder with a steri-

* *Annales de l'Institut Pasteur*, tome xiv., No. 4, April 25th, 1900.

† *Comptes Rendus de la Société de Biologie*, tome lli., No. 23, June 29th, 1900.

lized catheter. The case was one of mixed infection, *Streptococcus pyogenes* being cultivated from the blood. At the meeting of the same Society, on July 7th, Coyne and Hobbs read a paper on a case of acute appendicitis, from the pus of which *Bacillus coli communis* and *Bacillus pyocyaneus* were isolated, the latter largely predominating in number. T. R. Brown* records the case of a woman who underwent an ovariectomy for a cyst of moderate size. During the operation a number of pelvic adhesions had to be broken down, and the bladder was somewhat injured. Nine days afterwards there were symptoms of cystitis, the urine threw down a thick sediment and had an unpleasant odour. Two specimens drawn off with sterilized catheters gave pure cultures of *Bacillus pyocyaneus*.

A STREPTOCOCCUS NOT STAINING BY GRAM'S METHOD.—Cotlet and Tissier† describe a variety of streptococcus which is decolorized when stained by Gram's method. The micro-organism was isolated from a case of extravasation of urine, from a case of cystitis, and from the faeces of a breast-fed infant who was suffering from a slight attack of diarrhoea. The coccus grows in short chains of five to ten elements. It grows either aerobically or anaerobically on the ordinary culture media, except on potato from which no growth was obtained. It does not liquefy gelatin, it coagulates milk on about the sixth day, and retains its vitality on artificial media for about one month.

THE ELIMINATION OF BACTERIA BY THE LIVER AND KIDNEYS.—Métin‡ publishes a note on this subject. As the result of experiments on animals, he comes to the conclusion that the bloodvessels of the kidney and liver do not, when in a healthy condition, permit the escape through their walls of bacteria into the urine and bile. His results hold good for the urine and bile, after large quantities of bacteria had been introduced by either subcutaneous or intravenous injection, for at least six hours after the inoculation.

A CASE OF MOULD INFECTION IN MAN.—Ophüls and Moslit§ describe a mould parasite from the case of a farm labourer, who died after an illness characterized by pleuritis and inflammatory swelling of the joints, with high temperature, cough, slight rigors, and profuse sweating. In the pus of various abscesses which were found after death a number of protozoon-like bodies were identified, which appeared to correspond with the description given by others of a species of sporozoon, *Coccidioides immitis pyogenes*. From pus containing these bodies, however, a mould parasite developed on artificial media after forty-eight hours' incubation. After three subcultures had been carried out, a rabbit was inoculated with the mould. The rabbit was killed three weeks after the inoculation, and a number of small white nodules were found in the lungs and kidneys. No mould mycelium was present in the nodules, but there were a number of the protozoon-like bodies which had been found in the original pus. The authors conclude, therefore, that these bodies are not protozoa at all, but represent a stage in the fructification of the mould parasite.

BACILLUS COLI DYSENTERICUS.—The pathogenic properties of *Bacillus coli communis*, or of a variety of bacillus closely resembling it, have

* *Maryland Medical Journal*, May, through *New York Medical Journal*, June 30th, 1900, p. 1047.

† *Comptes Rendus de la Société de Biologie*, tome lli., No. 23, June 29th, 1900.

‡ *Annales de l'Institut Pasteur*, tome xiv., No. 6, June 25th, 1900.

§ *The Philadelphia Medical Journal*, June 30th, 1900.

frequently been discussed in relation with the causation of dysentery. A number of French pathologists have maintained that there is such a relation, but the fact that *Bacillus coli communis* is constantly present in the healthy intestine has prevented the general acceptance of their views. Roger* has returned to the subject, and has carefully investigated certain cases of dysentery contracted in Algeria and Brittany. In none of these cases was *Amoeba coli* present, and in all of them the only pathogenic organism identified was a bacillus which gave the ordinary culture reactions of *Bacillus coli communis* as obtained from the healthy intestine. But the bacillus obtained from these cases of dysentery differed from that obtained from the normal intestine in the constancy and vigour of its pathogenic action on rabbits. Cultures from the healthy intestine are known to vary very widely in this respect, and many such, when injected in large doses, produce little or no effect, whilst the action of their toxins is very feeble. Roger, by growing his bacillus in a mixture of equal parts of beef-broth and ox-serum for eight days, and then sterilizing the culture by means of chloroform (which was subsequently got rid of by evaporation), obtained a toxine of such strength that a dose of ten drops injected into a vein produced pyrexia and diarrhoea in rabbits of 2 kilogrammes weight, followed by death in from twenty-four to forty-eight hours. The toxine obtained by growing the bacillus in ordinary beef-broth and sterilizing by filtration was less active than the toxine obtained by growth in ox-serum, but was still much more powerful than that which can usually be obtained from the normal bacillus, its lethal dose being 2 c.c. per kilogramme of rabbit weight. The diarrhoea produced by intravenous injection of this toxine was very abundant, and the excreta were foetid, and contained glairy mucus and rarely blood. A rapid loss of weight occurred, and after death congestion of the abdominal organs with ecchymotic hæmorrhages into the mucous membrane of the intestines were found. As the result of his experiments, Roger concludes that this *Colibacille dysentérique* must be allowed to be a species distinct from the normal *Bacillus coli communis*, or, at any rate, a well-differentiated and constant variety.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

BEFORE GRANTHAM AND CHANNELL, JJ.

June 14th, 1900.

BENNETT (Appellant) v. HARDING (Respondent).

Public Health—Sanitary Conveniences—Cab Proprietor's Yard—"Workplace"—Persons employed in or "in attendance at"—Public Health (London) Act, 1891 (54 and 55 Vic., cap. 76), Section 38.

Case stated by a metropolitan police magistrate who had dismissed a complaint against the respondent, a cab proprietor, that he had un-

* *La Presse Médicale*, July 4th, 1900.

lawfully failed to provide sufficient and suitable accommodation in the way of sanitary conveniences for the persons employed in or in attendance at certain stables and stable-yard in his occupation, contrary to Section 38 of the Public Health (London) Act, 1891. The respondent kept on the premises 110 horses and a large number of cabs, and employed a number of men as horse-keepers and cab-cleaners. His business consisted in the letting out of the cabs and horses by the day to drivers, and cab-drivers were daily in attendance at the premises to hire horses and cabs, change horses, and return cabs after use. The horse-keepers and cab-cleaners when not at work lived with their families in different rooms, having sanitary conveniences, situate over different portions of the premises. There was no such accommodation in the stables and stable-yard. For the appellant it was contended (a) that the premises were a "workplace" within the meaning of Section 38 (1) of the Public Health (London) Act, 1891; and (b) that the respondent having failed to comply with the notice under Section 38 (2), he was liable to the penalties provided by the Act. For the respondent it was contended (a) that the premises were not a "workplace" within the meaning of the Act; and (b) that even if they were, the cab-drivers were not "in attendance" within the meaning of the Act. The magistrate was of opinion that the premises were not a "workplace" *ejusdem generis* with factory or workshop. The questions for the Court were (1) whether the stables or stable-yard were a "workplace"; (2) whether cab-drivers were persons in attendance at such building within the meaning of the Act.

H. Courthorpe Munroe and W. Leese for the appellant. *A. Macmorran, Q.C., and Ellis Griffiths* for the respondent.

The Court (GRANTHAM, J., and CHANNELL, J.) held that both questions must be answered in the affirmative. There was no reason for saying that the premises must be *ejusdem generis* with a factory or workshop; nor that the cab-drivers, who were on the premises for a substantial period of time, were not in attendance, for it made no difference that they attended as customers.

Appeal allowed.

BEFORE DARLING, J., AND A COMMON JURY.

June 30th, 1900.

THOMPSON v. THE VESTRY OF CAMBERWELL.

This was an action brought by Mr. David John Thompson, the plaintiff, against the defendants for damages for negligence in allowing sewage to escape from one of their sewers into the plaintiff's cellars.

Mr. Bowen Rowlands, Q.C., and Mr. Lincoln Reed appeared for the plaintiff; and *Mr. Tindal Atkinson, Q.C., and Mr. F. Low* for the defendants.

The plaintiff is the proprietor of the Queen's Head beerhouse in Basing Road, Peckham, having entered into possession in 1897. The premises drained into a sewer in York Road. An old 18-inch brick sewer ran down the Basing Road. When the plaintiff commenced his occupation of the premises, he found large quantities of water and sewage in the cellars. It was found that the drains were out of order. These were repaired in accordance with a notice from the Vestry. While the repairs were being done, the plaintiff discovered that liquid, which he thought was sewage, percolated into the cellar from a place

on the Basing Road side of the house. He informed Mr. Kerslake, the surveyor of the Vestry, who, having examined the place, pronounced the percolation to be only rain-water, and recommended the construction of a concrete wall. This was done, and for some months the nuisance ceased. It again, however, recurred in October, 1898. There was an escape of sewage into the cellars, accompanied by bad smells, and the plaintiff and his family were constantly ill. Between that date and May, 1899, the plaintiff, as he alleged, made several verbal complaints to Mr. Farmer, the sanitary inspector, and on May 1st he lodged a formal complaint at the Vestry office. The defendants then examined the sewer in Basing Road, and it was found that there was a stoppage in it about 150 feet below the plaintiff's premises. When this was removed, the nuisance ceased.

The sanitary inspector admitted that a complaint was made to him verbally by the plaintiff prior to May 1st, in answer to which he told the plaintiff to wait until there was something to show, and then send a letter to the Vestry office.

The defendants' case was that as soon as they had definite notice of the defect, they remedied it.

The jury found a verdict for the plaintiff with £100 damages, and judgment was entered accordingly.

ANALYTICAL NOTES.

INJURIOUS DYES IN SWEETS.—Mr. Alfred Stokes, F.I.C., the Public Analyst for the parish of St. Luke's, has made a report to the Vestry upon the use of injurious aniline dyes for colouring sweets. Mr. Stokes has recommended that the manufacturers of sweets found to be thus coloured should be cautioned against the use of these dyes, as the use of sweets so prepared is likely to be injurious to children and persons of delicate powers of digestion. The report was adopted, and it was decided to act upon the suggestion of the Public Analyst.—*British Food Journal*.

POISONOUS COLOURING MATTER IN COFFEE.—In a recent report of the London Chamber of Commerce mention is made of the fact that certain consignments of coffee were stopped by the authorities in Malta, as the coffee was alleged to have been coloured with lead pigments or other colouring matters which were injurious to health. The coffee in question was said to have been received from London. The consignees of the coffee had samples examined by some London analysts, and it is alleged that no salts of lead or foreign colouring matters were detected.—*British Food Journal*.

ERDMANN'S REAGENT (AMIDONAPHTHOL-K-SULPHONIC ACID) FOR NITRITES IN WATER. H. MENNICKE.—The present author agrees that Erdmann's new reagent (*Analyst*, xxv. 81) is most useful. Its indications are perfectly certain. They are not affected by the presence of ferric chloride, nitric acid, or other oxidizing agents; a large excess of the latter bodies only causes the colour to be more wine-red. The limit of sensitiveness for a sharp eye in daylight is 1 part of sodium nitrite per 300,000,000; i.e., it is about 300 times more delicate than starch and potassium iodide. The colour attains its maximum intensity in half an hour. Mennicke quotes analyses of several town and waste waters, which fully bear out his statements.—*Analyst*.

- Dey, A., M.B.**, appointed M.O.H. of Glendale Rural Sanitary District.
Fraser, P., M.D., reappointed M.O.H. of Carnarvonshire County Council.
Gimson, K., M.B., appointed M.O.H. of Witham Urban Sanitary District.
Gray, W. G., L.R.C.P., appointed M.O.H. of Holsworthy Urban Sanitary District.
Hargreaves, I. A., M.B., reappointed M.O.H. of Wetherly Rural Sanitary District.
Limrick, W. S., L.R.C.P., appointed M.O.H. of Great Crosby Urban Sanitary District.
MacDonald, C. R., M.D., appointed M.O.H. of Burgh of Troon.
Martin, F. W., M.R.C.S., reappointed M.O.H. of Brighthouse Urban Sanitary District.
Martin, J. M., M.B., appointed M.O.H. of Stroud Rural Sanitary District.
Mitchell, A., M.D., appointed M.O.H. of Guildford Urban Sanitary District.
Peck, H., M.D., appointed M.O.H. of Chesterfield Urban Sanitary District.
Simons, C. E. G., M.B., appointed M.O.H. of Merthyr Tydvil Urban Sanitary District.
Symons, W. H., M.D., reappointed M.O.H. of Bath Urban Sanitary District.
Weaver, J. J., M.R.C.S., appointed M.O.H. of Southport Urban Sanitary District.
Webster, F. J., M.R.C.S., appointed M.O.H. of Vaynor and Pendryn Rural Sanitary District.
Whitaker, E. T., M.B., appointed M.O.H. of Wem Urban Sanitary District.
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PUBLIC HEALTH

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NOTES ON SANITARY ADMINISTRATION.*

By A. NEWSHOLME, M.D.,

Medical Officer of Health of Brighton; President of the Incorporated Society of Medical Officers of Health.

I. SCHOOL NOTIFICATION OF INFECTIOUS DISEASES.

In elaborating this system certain facts have been taken for granted. It is assumed, what is matter of common experience to all, that public elementary schools greatly favour the dissemination of infectious diseases. The exact extent to which such diseases are spread by school attendance may be a subject for debate, but that school attendance is an important element in this matter will, I think, be admitted by all who are competent to judge.

As a high average attendance is an essential factor in the status of and grant to schools, it is not surprising that there is a natural tendency to incomplete co-operation between teachers and medical officers of health. My object has been to bring teachers into line with my department. During the last two years a system has been evolved which has gradually secured this.

Under the Education Code the medical officer of health can issue certificates in respect of children excluded from school by order of the sanitary authority, thus preventing loss of grant on behalf of the school authorities. In accordance with the plan now to be sketched, an additional grant of about £127 was earned by the Brighton School Board during the school year 1898-99. In the present year the additional grant, owing to the more complete co-operation which I am now able to secure from both Board and Church Schools, will probably exceed double that amount. It is obvious, however, that if, as has been done in certain towns, all

* Abstracts from an Address given at the Annual Provincial Meeting of the Incorporated Society of Medical Officers of Health at Brighton, June, 1900.

The details will be clear from the appended printed form :

Form for Notification of Infectious Diseases to Medical Officer.

Name of Scholar.	Date of last Attend- ance at School.	Date when reported to M.O.H.	Date when Scholar may return to School.* (This column to be filled in by M.O.H.)	Supposed Nature of Illness.	Inclusive dates within which Scholar was absent from School on account of notice of Sanitary Authority. (This column to be filled in by M.O.H.)

* This date is subject to no other case of Infectious Disease arising in the House.

Name of School
Department
Teacher's Signature

Each day I receive notifications on these forms from some school or other. The cases are visited at home by the district inspector or special inspector for infectious diseases, and on the basis of facts thus ascertained, the future duration of absence from school is decided, and an intimation to this effect sent to the teacher.

It is unnecessary to describe the details of inspection or of the precautionary measures taken, as these are common ground. I may, however, draw attention to the circular left with the parent, which facilitates the later work of the attendance officer, and prevents him from being imposed upon by an erroneous statement of the parent that children are being kept from school "by order of the sanitary authorities."

To the occupier of

To the occupier of _____
 You are hereby instructed to keep ALL CHILDREN in your house away from day-school and Sunday-school, and not to allow them to come into contact with other children during the next _____. The infectious patient must be kept strictly isolated in a separate room from the rest of the family for the same period.

WARNING.

Any person in charge of any infectious patient who allows such patient to mix with others, or transmits any article which has been exposed to infection without previous disinfection is liable to a penalty of £5.

No milk-can should be taken into the house where there is any suspicious case of infectious disease. Library books must not be returned from such a house, but information given to the sanitary inspector.

No visits should be made to neighbours or allowed by neighbours while any suspicion of infection exists.

ARTHUR NEWSHOLME, M.D.,
 Local Officer of Health

exists.
ARTHUR NEWSHOLME, M.D.,
Medical Officer of Health.

It is unnecessary to draw attention to the fact that the system just sketched, although it does not give an exact quantitative statement, is an excellent qualitative guide to the prevalence of the minor infectious diseases, and when tabulated in accordance with their incidence on schools, seasons, and years, will furnish useful epidemiological facts for future guidance.

During the last year I have extended the above system to certain chronic diseases. I have undertaken to sign up for children suffering from phthisis, and for cases of ringworm and pediculosis. In each of these cases no visits are made from my department, but the duration of exclusion from school is determined by medical certificate of the medical officer of the School Board, or of a private medical practitioner.

II. NOTIFICATION OF PHTHISIS.

During the last eighteen months I have been working tentatively a system of voluntary notification of phthisis by medical practitioners. At first notifications were requested only from medical practitioners attached to hospitals and dispensaries, or in poor-law work. Gradually this has been extended. In May last I sent out the following circular letter :

RE NOTIFICATION OF CASES OF PHTHISIS.

Public Health Department,
Town Hall, Brighton,
May 12th, 1900.

DEAR SIR,

On pages 33 to 36 of my annual report, which has recently been sent to you, you will find particulars of an attempt made during the last nine months to inaugurate a voluntary system of notification of cases of phthisis, which has been attended with very considerable success. The request to notify such cases has hitherto only been sent to the medical officers of public institutions, and other doctors engaged in attending the poor.

I now beg to invite your co-operation in this effort to diminish the spread of phthisis by dust-infection. As you are aware, even though every care is taken as to the disposal of sputum in a given case attended by you, it is very desirable that the room occupied by the patient should be cleansed and purified before any other person sleeps in it. This will be carried out on application at the Town Hall.

As to Duplicate Notification.—The sanitary committee instruct me to add that they do not desire cases to be notified which have been notified by another practitioner within the last three months, unless there has been a change of address in the meantime. As cases will only be notified with the consent of the patient, there will, it is thought, be no difficulty in obtaining information on this point.

Notification of Moribund Cases.—The notification of moribund cases is not desired, as the information about such cases comes with the official death-returns.

Arrangements have been made for examining, without fee, specimens of sputum from patients, the nature of whose illness is dubious, and it is desirable that this provision should be utilized in all such cases.

The fee to be paid for notifications received in accordance with the above suggestions will be the same as under the Infectious Disease (Notification) Act.

I enclose herewith a copy of the precautionary cards usually left at the house where a case of phthisis is notified, and sincerely trust that you will be able to co-operate with me in attempting to remove the conditions favouring the spread of this disease.

Yours faithfully,
ARTHUR NEWSHOLME, M.D.,
Medical Officer of Health.

It will be noticed that rights are reserved to object to duplicate notifications, to notifications of moribund cases, and, for reasons which will be readily appreciated, to test the diagnosis by examination of sputum. This last right will be very seldom exercised, but it is necessary in certain instances.

The circular letter was sent out about May 19th. In the five weeks which have elapsed twenty-two notifications have been received. Each case has been subsequently visited either by myself or a skilled inspector, in whose discretion I have entire confidence. The cases are revisited at the end of three months. This task I have recently undertaken, and I have been gratified at the absence of difficulty in connection with these visits, and at the readiness of householders and patients to co-operate.

When a notification is received, at the first visit, the following particulars are ascertained :

PHTHISIS.

No. in Notification Register Address
Name and Age Doctor
Date of Notification
Duration of Illness
.....
Places of Residence during Illness
.....
Occupation during last 5 years
Other Cases in the Family or House
No. of available Dwelling Rooms in House

AGES AND SEX OF OTHER RESIDENTS IN HOUSE.

Family of Patient.	2nd Family.	3rd Family.
--------------------	-------------	-------------

Condition of Dwelling-house as to—

Condition of Premises

Overcrowding.....	
Cleanliness {	of walls.....
	of ceiling
	of floors
	of bedding, etc.
Dampness	
Ventilation	
Lighting, especially of Staircase	
Size of Yard	
Any Sanitary Defects	
Remarks as to Precautions	

Date of Inspection :

In my own visits I have never had the slightest difficulty in obtaining all the information required.

A copy of the card of precautions (see below) is left; and the opportunity is taken of emphasizing the simple character of these precautions, and the fact that no risk is incurred if these precautions are followed. It is also pointed out that the same precautions greatly facilitate the recovery of the patient. At each visit I carry with me a supply of Japanese handkerchiefs. These cost 17s. for 2,000, and each is large enough to make two handkerchiefs. The distribution of these has had very favourable results, and further supplies are now being asked for at the Town Hall.

PRECAUTIONS FOR CONSUMPTIVE PERSONS.

Consumption is, to a limited extent, a contagious disease. It is spread chiefly by inhaling the expectoration (spit) of patients which has been allowed to become dry and float about the room as dust.

Do not spit except into receptacles, the contents of which are to be destroyed before they become dry. If this simple precaution is taken, there is practically no danger of infection. The breath of consumptive persons is free from infection.

The following detailed rules will be found useful both to the consumptive and to his friends:

1. Expectoration indoors should be received into small paper bags, and afterwards burnt.
2. Expectoration out of doors should be received into a suitable bottle, to be afterwards washed out with *boiling water*; or into a small paper handkerchief, which is afterwards burnt.
3. If ordinary handkerchiefs are ever used for expectoration, they should be put into *boiling water* before they have time to become dry, or into a solution of a disinfectant, as directed by the doctor.
4. Wet cleansing of rooms, particularly of bedrooms occupied by sick persons, should be substituted for "dusting" and sweeping.
5. Sunlight and fresh air are the greatest enemies of infection. Every patient should sleep with his bedroom window open top and bottom, a screen being arranged, if necessary, to prevent direct draught; and, if possible, occupy a separate bedroom. The patient need not fear going out of doors in any weather, if warmly clad.
- N.B.—The patient himself is the greatest gainer by the above precautions, as his recovery is retarded and frequently prevented by renewed infection derived from his own expectoration.
6. Persons in good health have little reason to fear the infection of consumption. Overfatigue, intemperance, bad air, dusty occupations, and dirty rooms favour consumption.

I need not say that interference with a patient's occupation has never been attempted, and I have reason to believe that the cleansing and other work carried out as the result of our visits have been productive of great good. At the first visit a complete inspection is made of the house, and the notices found necessary are issued. This aspect of the question there is no time to discuss, though it is

not the least important portion of the work effected by our visits to phthisical homes.

One hiatus is still left in our local attempts, and I am not without hope that the public press may help to draw attention to this. Repeatedly I have found phthisical patients in homes where the chances of recovery are of the faintest. Will not some of the wealthy inhabitants of Brighton come forward with money and enthusiasm sufficient to insure a sanatorium for phthisis, in which patients may receive voluntary treatment under the most favourable conditions?

For some years before the above system of visitation of homes of phthisical patients was inaugurated, similar inquiries had been systematically made in connection with every death from phthisis in the town. The following letter was issued in respect of each death registered:

Public Health Department,
Town Hall, Brighton,

..... 189 .

DEAR

In connection with the death from consumption (phthisis) registered as having occurred at No. allow

me to draw your attention to the important fact that consumption is chiefly communicated from one person to another by inhaling the dust of the room occupied or previously occupied by the patient. Hence, it is most important that the house should be thoroughly cleansed, and all trace of dust removed, wet cloths being used for this purpose.

I beg to advise you that the following works are necessary, in order to prevent the risk of similar cases arising in the house, viz.:

1. Strip the wall-paper off the wall. The paper should afterwards be burnt in the fireplace of the same room.

N.B.—The chief danger is from dust; hence, all articles should be thoroughly wetted before cleansing them. A supply of disinfectant for mixing with the water can be obtained free of cost at the above office at the Town Hall; but a disinfectant is not essential if everything is thoroughly wetted.

2. Thoroughly wash the floors, walls, ceiling, and all the woodwork (including picture-frames) of the room.

3. Wash all bed and body linen and other washable articles in the room, and expose all personal apparel, bedding, pillows, etc., out of doors for several hours in bright sunshine.

Yours obediently,

.....
Medical Officer of Health.

III. DISINFECTION BY SPRAYING.

For the last two years we have ceased to employ sulphurous acid fumigation in Brighton. It is unnecessary to dwell on the reasons for this. It will, I think, be generally agreed that what is required is not *aerial* but *surface* fumigation. Surely the best

means to secure this is by direct application of the disinfectant to the infected surfaces. I do not think that this can be so effectually managed by volatilization of the disinfectant as by its direct application to infected surfaces. Furthermore, some of the best disinfectants are non-volatile. Hence, either washing the walls and other infected surfaces with a disinfectant solution, or spraying such a solution over them, is, in my opinion, the best practicable plan. Washing wall-papers, etc., may cause unnecessary damage, while spraying with a fine spray, like that produced by the Equifex spray apparatus, is free from this objection.

For the reasons thus briefly summarized, we have in Brighton disinfected all rooms during the past two years by means of the spray apparatus.

At my request Mr. Defries has recently made for me a more portable form of spray apparatus, which removes the only objection (weight of apparatus) which could previously be urged against this method.

As to solutions used, we have tried corrosive sublimate solution, which was soon abandoned; formalin, which is good, but somewhat irritating; and chinosol. The last-named is pleasant in use, I believe efficacious, and cheap.

Two tablets dissolved in a quart of water give a solution of 1 in 600. Two quarts of water are required for a room containing 1,000 cubic feet, the expense being less than 1½d.

IV. WORK OF THE MUNICIPAL BACTERIOLOGICAL LABORATORY.

In connection with this work, the President exhibited outfits for taking specimens in cases of diphtheria and enteric fever, and also for taking samples of sputum from phthisical patients. The diagnosis obtained by this means was, he said, of the greatest possible value. Bacteriological examinations were always made before discharging diphtheria patients, on admission of every scarlet fever case, in order to insure that there was no diphtheria infection mixed with the scarlet fever, and in cases of doubtful sore throats in schools. It was not an absolutely certain method, but an extremely valuable auxiliary to other methods. The diagnosis of phthisis from sputum was greatly valued by the practitioners of Brighton, as judged from the number of specimens sent in.

DETECTION OF NICOTINE.—If unresinified nicotine is mixed with a drop of 30 per cent. formaldehyde, and a drop of strong sulphuric acid is added, an intense rose-red colour is produced, which becomes dark red in the presence of 0.005 or 0.01 gramme of the alkaloid. Concentrated formic acid may equally replace the formalin.—*Analyst.*

THE PREVALENCE OF ENTERIC FEVER IN WARRINGTON DURING 1899.*

By J. GUEST GORNALL, M.B.,

Assistant Medical Officer of Health of the Borough of Warrington.

ENTERIC (typhoid) fever is a disease which is seldom, if ever, absent from large centres of population, especially manufacturing towns, and to this experience Warrington forms no exception; but the past year, 1899, has been notable for a considerably increased prevalence of it, more particularly in the St. John's Ward of the borough.

The dates of notification show that during the first six months of the year only seven cases were reported, and those in widely separated parts of the town. But in July there was a great increase in the number of cases, which continued during the rest of the year, reaching its maximum in September, and after that gradually declining. These notifications were distributed as follows:

In July	...	...	...	12
„ August	...	...	...	14
„ September	...	...	...	58
„ October	...	...	...	27
„ November	...	...	...	20
„ December	...	...	...	11

These figures are in accordance with the established fact that enteric fever is more prevalent in the autumn than at any other time of the year, especially after a dry and hot summer. This latter condition is precisely what was experienced in 1899, and whatever the exact connection prevailing between such climatic conditions and the increase of the epidemic, they must have had something to do with either (1) the growth, or (2) the diffusion of the bacillus.

In 1899, after a warm and dry spring and summer, the autumn was characterized by a good deal of rain, not incessant, but sufficient to keep the ground fairly moist. At that time of the year the surface of the land dries very quickly, and high winds and dust follow quickly on humid conditions. In the autumn months of 1899 there was precisely the kind of weather that might be expected to promote the growth in and diffusion from polluted soil of *Bacillus typhosus*.

Statements as to "the number of days ill before notification" are certainly open to question, because though the date of notification

* Extracts from a special report.

is a fixed point in time, that of the beginning of the illness has to rest upon the not always accurate memory of the patient or his relatives. In the majority of instances the case is brought to the notice of the Health Department some time after the ninth day on which we have learned that the infecting bacilli begin to be discharged from the bowels. How is this delay to be accounted for?

1. Many of the patients were able to go on working after the onset.
2. By delay in seeking medical advice, either because of the slightness of the illness or from pure neglect.
3. By delay on the part of medical men in notifying. Difficulty in the recognition of the disease, I doubt not, forms a good excuse in many instances; but when we remember that it is the duty of the medical man to notify as soon as he is aware that he has to do with this infectious malady, and also that in the great majority it is possible to form an opinion by the end of the first fortnight, in many of the cases the time elapsing before notification seems excessive. To notify after a month's illness, and, not improbably, during that period to neglect proper measures of disinfection, is not the best way to aid the cause of public health. It is much to be desired that before passing so long a period in a state of doubt—for one must suppose the possibility of an illness being enteric fever is not an after-thought—some further assistance in diagnosis be obtained, and I would strongly urge the more general adoption of the blood-serum test of *Widal*.*

Ninety-two of the patients were males, fifty-seven females, showing a preponderance of the former greater than is usual, which does not seem easily accounted for. There naturally arises the question whether males were more exposed to infection. This may have been due to their coming into contact while at work with mild cases, such as we believe to have been numerous. Of the deaths, sixteen occurred in males and eight in females, so that the proportions to the cases in each of the two classes do not differ much.

The ages of the patients agree with the generally received opinion that enteric fever is a disease more likely to affect persons in youth and early adult life. I have classified the patients according to the numbers at different ages, thus:

* The Corporation has wisely undertaken to have this done, free of cost, by Professor Boyce, of Liverpool.

Ages.	0-5.	5-10.	10-15.	15-25.	25-35.	35-45.	45-55.	55-60.
Number of cases ...	8	23	27	35	30	19	6	1
Deaths ...	1	3	5	4	5	5	0	1

An examination of the situation of the dwellings where cases have occurred shows that there was a relatively greater prevalence in St. John's Ward. It has been a matter of observation in numerous previous outbreaks that one or other quarter of the town has been more severely attacked than the rest. At one time it has been the neighbourhood of Mersey Street, at another that of White-cross. The fact, however, has been repeatedly established, and various theories brought forward to account for it. For such a circumstance cannot be merely a matter of what is called chance, but must depend upon a cause or causes acting more powerfully upon the particular neighbourhood than upon the rest of the town.

At an early stage of the outbreak it became apparent that a triangular area* bounded by Orford Lane, Battersby Lane, and Lythgoes Lane was the chief focus of infection. This state of things continued on into the autumn, though at a later period cases became more frequent in the rest of the town. The inquiry which we set out to make—viz., the causes of the unusual prevalence of enteric fever—was almost narrowed into the smaller but not less difficult question of its unwonted excess in this area.

This part of the town has in recent years rapidly increased, a great number of houses having been built and new streets formed. The supervision by the municipality, and the enforcement by it of sanitary requirements commensurate with the new development, have unfortunately not been satisfactory. This will be seen from the following particulars:

Dwelling-houses occupied ...	1,229
" unoccupied ...	31
Inhabitants ...	6,029
Erections in backyards obstructing air-space ...	169
Yards with defective or unpaved surfaces...	268
Passages unpaved ...	27
Streets unpaved ...	4
" with portion unpaved ...	3
Pieces of vacant land ...	4

* To be known hereinafter as the "special area."

A good deal of the ground on which the houses are built is what is known as "made land," *i.e.*, is due to the filling up of old pits and other depressions and irregularities of the surface by the tipping of street refuse and rubbish of various kinds, a process that has in this case been going on for many years. It is consequently soil of a porous character, and liable to contain an excess of organic matter. There is one open space at the back of Birchall Street, which was years ago the site of some clay pits, subsequently filled up in the way which I have indicated. This is now in wet weather covered with puddles, and in dry supplies quantities of dust for the wind to blow into and around the neighbouring houses. It is a place for the deposit of all kinds of filth and rubbish, as well as a playground for children.

This is only one instance of the spaces of ground in the area which seem to present conditions favourable to the spread of disease. The numerous unpaved passages and unpaved or badly-paved yards enumerated in the above list are likewise exposed to pollution, which may be not merely superficial, but sink into the soil. But another important feature of our special area which, if not certainly a source of danger, is open to grave suspicion, apart from all question of good and efficient management, is the existence in it of the intercepting depot situated in Norman Street. This, as ought to be known, is one of the two stations (the other being in Howley) to which the night-soil pails are taken, and from which their contents are propelled along underground pipes by means of pneumatic pressure to Longford depot. The pail system will be seen to have an important bearing on the question of enteric fever, seeing that the stools are after the ninth day dangerous. For years we have attempted to cope with this difficulty by having the pails from infected houses collected daily instead of weekly, for this purpose making use of special tubs, which are each night subjected to a thorough process of cleansing and disinfection; but we have seen how many persons with enteric fever were during last year unreported. It is not difficult, if indeed disagreeable, to imagine that during that time tubs overflowing with liquid excreta in course of removal polluted yards, back passages, streets, or even house-floors, for in one case at least the tub had to be carried through the kitchen.

Another place where it seems likely that contamination of the ground may occur with great frequency is at the other end of the journey, the intercepting depot.

I must say that I have nothing but praise for the way in which the one in Norman Street is managed, and believe that every effort

is made to keep it clean and free from traces of excreta; but with the greatest care there is certainly an element of danger in a building situated amidst a teeming population being used for such a purpose. It has been pointed out, on the other hand, that the men engaged in this work, though constantly exposed to infection, rarely, if ever, get infected. This, however, is most likely to be accounted for by their acquiring an immunity against enteric fever, just as in India it is the recruits fresh from England, not the older soldiers, who have become acclimatized, that are stricken down with this disease, though both classes are constantly using the same contaminated drinking-water.

I may seem in the above remarks to have cast a slur upon a system of refuse disposal which has been established for a good many years, and could not be abolished without great expense and disturbance of existing conditions. Moreover, the flatness of the town makes water-carriage, the ideal system, a matter of great difficulty. But though I must admit that I look upon the existing arrangements for refuse disposal as a possible source of danger, though they are a great advance upon the former middens, I believe that improvements in detail are not impossible, and that the abolition of other adverse conditions would greatly help to diminish the peculiar dangers of the pail system. If we could secure the prompt calling in of medical aid, early diagnosis, and removal to hospital of all cases, even those where the evidence for enteric fever is not complete, we should go very far towards abolishing any risk of the pail system leading to more cases.

The following table gives particulars of the number of cases and deaths in (1) the special area, (2) the rest of the borough, and their relative proportions to the populations therein. The same districts are then compared in respect of the numbers of houses infected:

	Population.	Number of Cases.	Proportion to Population.	Deaths.	Proportion to Cases.
In special area	6,029	54	0.895 per cent. or about 9 per thousand	6	11 per cent.
In rest of borough	57,971	95	0.163, or over 1½ per thousand	18	18 per cent.

This gives an incidence upon the population in the special area five times as great as in the rest of the borough:

	Number of Houses.	Houses Infected.	Percentage.
In special area ...	1,198	39	3·2
In rest of borough ...	10,572	82	0·7

The following are the numbers of cases of the disease in the area and the rest of the borough during the past four years. Of course, it must be remembered that during this time the population in both cases has been increasing considerably.

		In Special Area.	In Rest of Borough.
1896	...	2	33
1897	...	4	37
1898	...	3	38
1899	...	54	95

Several points in connection with possible sources of infection call for attention.

1. In the great majority of cases no origin can be even suggested.
2. In certain instances second cases occurred after such an interval as suggested direct infection; and third, fourth, and even fifth cases in one family were reported.
3. Certain of the patients, though living outside the special area, appear to have derived their infection within it. Such had either (1) been taken ill soon after leaving one of the houses in the special area to live elsewhere, and became, to all appearance, a source of danger to the new neighbourhood; or (2) had visited the houses of people in the area, and been taken ill subsequently in their own dwellings in other parts of the town, with possible danger to their neighbours.
4. The cases in which some definite cause, apart from direct infection, is suggested. Thus, in the first case in the special area the patient may have contracted his illness from eating oysters in Southport, and have been the starting-point of a whole series in his neighbourhood.

Even assuming the truth of the possible causes, and excluding from consideration those cases which bear the appearance of being secondary, we have a great number of doubtful origin, of which an extraordinarily large proportion is confined to one particular region, of which I have already given some description. Be it understood that the insanitary conditions to be found there are, unfortunately, prevalent in almost every other quarter of

the town, and that those of them are most important which favour the growth and dissemination of the *Bacillus typhosus*. A localized outbreak must depend either on (1) contamination of some drink or food supply common to a large number of inhabitants, either before or after reaching the area; or (2) the distribution to various individuals, *singillatim*, of bacteria from one common centre, such as a case of fever, or a spot polluted by typhoid excreta (and, subsequently, from more numerous secondary centres), by flies, by the wind, etc. Under the former heading the milk and water supplies called for consideration:

(a) The water-supply from Winwick is that of the whole town. Therefore, if water were the cause, it must have been by the contamination, not of the whole supply, but of the main going to the special area. The map showing the water-supply of different districts makes it clear that there is no main the pollution of which would be likely to result in the distribution of infection to the area in question rather than to other parts. The area is not supplied by a terminal main, but by an intricate network of pipes, which is joined to that of the surrounding regions.

On two separate occasions the water from the main in Birchall Street was examined chemically, and found to be up to its usual good quality; and once for *Bacillus typhosus* by Professor Boyce, with negative result. I am quite aware that the pollution of a main due to insuction from the ground may be very transitory, and that no absolute certainty could have been reached except by repeated examinations at short (say, daily) intervals. My case in favour of the water-supply would have been stronger if this had been done. But, after examining the map showing the mains, I am convinced that no such pollution could have resulted in the peculiar aggregation of the disease in the special area. The epidemic would have been more widespread.

(b) Similarly, inquiry into the milk-supply does not help us. I ascertained the name of the dealer and the farm or farms from which his milk came, for each house where the disease occurred, and very few patients had the same dealer, and a different farm supplied each dealer.

Milk and water being the only two likely media of a common infection, we are left to our remaining hypothesis, for which I have already shown, by a process of exclusion, the conditions of the special area are very favourable. Let us enumerate them:

1. Unrecognised cases treated at home for long periods.
2. The intercepting depot, to which were incessantly brought pails from houses where cases like the above existed.

3. Unpaved passages and streets, defective and unpaved yards, waste pieces of land, always the receptacles of organic refuse, at times possibly having excreta from enteric patients spilt on them, and forming a splendid breeding-ground for bacteria.

It would have added convincing proof to a supposition which seems to me best to explain the facts if we could have detected *Bacillus typhosus* in soil taken from this region. Five samples taken from suspicious spots were examined by Professor Boyce, but only the ordinary bacteria always present in soil were found.

Though, therefore, I am strongly inclined to believe that the larger number of cases in this area is to be accounted for by distribution of infection by various means (other than the water and milk supply) from one or more centres, there is not sufficient evidence for any dogmatic assertion.

It has already been seen that in the rest of the borough it is possible to trace a connection in several instances with cases in the special area. Assuming the truth of my hypothesis, is it unreasonable to suppose, that as one or more cases formed a focus of infection for the special area, so that area was itself the chief, if not the only, cause of the general dissemination of enteric fever throughout the town?

The tendency of my argument, so far, has been to discount the influence of bad drains as a direct cause of enteric fever, and to elevate into a comparatively higher degree of importance such sanitary defects as unpaved and defective yards and passages, and such nuisances as are connected with pail-closets. But drain defects are, we know, a prolific source of ill-health, and may indirectly contribute to any epidemic. If, then, as a result of the deficiencies discovered during the inspections carried out in consequence of the epidemic, there has been anything like an adequate restoration of good sanitary conditions, it will not be labour lost. The appalling number of drains reported as unsatisfactory, as well as all kinds of other nuisances brought to light, such as unpaved yards, damp basements, etc., are but a small part of the evidence by which we are continually having brought home to us that the problems connected with the housing of the working classes meet us at every turn in our inquiries into the causes of ill-health among the people. Unfortunately I can feel no confidence that all these damp houses, defective drains, unpaved yards and passages, are now in a condition which I could certify as sanitary; and on the other hand I have little doubt that at the present moment, in other houses in this special area and throughout the town, a similar

dangerous state of affairs is in existence, or is arising as a consequence of construction originally faulty. Meanwhile, new houses continue to be erected without any supervision from a building inspector, and scamped work and neglected details promise to provide for the future a state of things which accounts in great measure for the evils under which we labour at the present time.

We from time to time are accustomed to hear amateur lecturers on sanitation mentioning enteric fever as a typically preventable disease. It is sufficiently obvious that such persons, from the way in which they ask why it is not prevented, do not apprehend the real difficulties which lie in the way of such an achievement. If all we need to do be to secure the purity of our water-supply at its source, we can answer that we have already done that, but that there remain innumerable possibilities of pollution between Winwick and the consumer, and besides that there are the constant perils from milk, oysters, and other food, in all of which cooking affords an easy safeguard, though one likely to be neglected. Then the remedying of drain defects, however important, does nothing to put away all other kinds of evils, which we have shown reason to believe have a vastly more important bearing on the question. These evils are of a constantly recurring character, and if stamped out in one district are quickly reproduced in another.

Hospital Accommodation.—For many years six beds have been all that have been provided for this disease, the ridiculous inadequacy of which to the emergency of last year needs no explanation. The long delay in bringing up the hospital accommodation to the requirements of the population (now at length to be ended) can, I believe, be rightly held accountable as an accessory cause of the loss of lives valuable at any rate to someone. The following are the numbers of persons (1) treated at home, (2) removed to hospital, with the deaths in each class:

	Nos.	Deaths.	Per cent.
Treated at home ...	106	14	12.2
Treated in hospitals...	43	10	23.2

Let no one looking at these figures immediately jump to the conclusion that home treatment is more favourable to recovery than removal to hospital, for the explanation of the higher death-rate of the cases dealt with in the latter way is that only the worst cases were removed, and that very often only on the request of relatives. The Medical Officer of Health was empowered by the Health Committee to engage the services of a nurse for such houses as seemed necessary, and the nurses of the Warrington Association,

to my knowledge, rendered valuable assistance; but surely everyone who has had to do with enteric fever in the houses of the poor will admit that treatment under such conditions is entirely unsatisfactory at the best, and offers no such chance of recovery as a municipality ought to afford to those who suffer the results of insanitary conditions, which have been unfortunately allowed to exist. About the danger of home treatment to others I have said much.

In conclusion, there remains little or nothing for me to add; but I must say that I look for more valuable results from the careful attention to details of sanitary administration, both preventive and curative, rather than from any sweeping and drastic changes. The information which the systematic inquiries of the sanitary staff have elicited makes it, to me at least, quite clear that the maintenance of a healthy condition of the population can only be accomplished by improving their general environment, by securing the soundness of their dwellings, the wholesomeness of the arrangements for refuse disposal, and by abolishing all those conditions such as unpaved passages, etc., which are elements of danger. The changes which are thus shown to be desirable would not, I feel convinced, be without their effect in preventing a widespread dissemination of enteric fever, and if our second line of defence were intact, viz., all the proceedings that begin with prompt calling in of medical advice, and end in isolation of the patient at the earliest moment, combined with thorough disinfection, we should have gone far in the direction of the entire prevention of such calamities as we had in 1899.

PRESERVATIVE ACTION OF COMMON SALT.—According to A. Petterson (*Archiv. für Hygiene*, vol. xxxvii., p. 171), common salt does not exhibit the same degree of inhibitory action with all forms of bacteria, those which attack albumin most vigorously being the most easily affected, and bacilli in general being much more sensitive than cocci. When its proportion in the raw material exceeds 5 per cent., the growth of obligate anaerobes is inhibited, and only aerobes and facultative anaerobes are to be found. The growth of bacilli as a class is inhibited by 10 per cent., but a few species will withstand 12 per cent., and in pure bouillon cultures even 15 per cent. Cocci as a class grow very well in the presence of 15 per cent., and so does a certain yeast observed in preparations of meat and fish. The chief factors in the activity of salt as a preservative are general retardation of growth of organisms, and inhibition of those which decompose albumin. When fish are preserved with the smallest amount of salt necessary to prevent putrefactive changes, extensive growth of organisms which do not induce putrefaction is not prevented, and these may bring about desirable changes in appearance, smell, and taste.—*Amer. Jour. Med. Sciences*.

THE NEED OF A STATE DEPARTMENT OF PUBLIC HEALTH.*

By JOHN HIGGET, M.D.,
Medical Officer of Health of Workington.

My first duty is to thank you, and that most sincerely, for the high honour you have done me in placing me for the ensuing year in the Presidential Chair, and to assure you that so far as my limited powers allow it will be my earnest endeavour during my term of office to do all that I can to further the interests of this Border Branch of the British Medical Association.

On an occasion such as this it is the invariable rule, I understand, to expect from your President something in the nature of an address. I cannot, if I would, escape from this custom, though in this case, in the words of the poet, I think I may truly say that it hangs upon me as "a weight heavy as frost and deep almost as life."

In the few remarks which I have to offer you I intend to return to a subject which has already attracted my attention, and which I very imperfectly dealt with in a paper which I wrote some years ago on the matter of "State Obligations in Relation to Public Health"; and I am the more inclined to do so because, being myself a medical officer of health, and having been for some time actively engaged in public health work, I feel that I can on this account speak from an experience which has extended over many years, and with a conviction which time has only served to deepen. The question, then, to which for a short time I wish to direct your attention is on the necessity which I think exists for the establishment of a State Department of Public Health, with a special Minister attached. I venture to call this an important question, the most important, to my mind, on which public attention can and ought to be concentrated. And yet when one thinks about it and looks around at the callousness and indifference displayed, the undue importance attached to some other matters of the most trivial interest, one wonders how it is that this subject has hitherto received so little attention at the hands of the Legislature. For after all, as Mr. Disraeli said in his memorable speech delivered in the Free Trade Hall, Manchester, 1872, "The first consideration of a Minister ought to be the health of the people. Pure air, pure water, the inspection and condemnation of unhealthy habitations, the adul-

* Presidential Address read before the Border Counties Branch of the British Medical Association, July, 1900.

teration of food, and many kindred matters, might be legitimately dealt with by the Legislature."

I need not tell you, for it is a matter on which you are all informed, how public health affairs are at present regulated in this country; but it is not too much to say that the special department, the Local Government Board, is simply crowded out with work, that it is woefully undermanned in the matter of special scientific assistance, and that it is utterly unfitted to deal efficiently with the great sanitary problems which stand ready for solution. To throw even part of the work upon county councils, parish councils, and the like, only tends, in my opinion, to make matters rather worse instead of better. It is the whole head that is sick. Decentralization in this way will not help us or supply us with a remedy. It is a mere sop thrown at the heads of the great British public by men who, like Gallo, care for none of these things, intended not so much to fulfil any useful practical purpose, so far as sanitary matters are concerned, as to minister to that spirit of self-complacency and self-importance which for the time being at least are the special narcotics which lull the mind of the public into a state of false security. The necessary awakening can only be accomplished in one way—educate, educate, educate! Show the people the fools' paradise in which they are living—alas! that it should be said many of them dying!—the need for further State interference in matters of public health, and then reform will speedily come. Let every constituency throughout the length and breadth of the land impress upon its representatives that a few millions annually devoted to the preservation of human life, instead of to its destruction, would be sound policy from an economic point of view, and that such a course is indeed in strict keeping with that great period of social reform towards which we hope the future of our race is tending. This is a matter in which we must work out our own salvation—we, the so-called intelligent and independent electors of this great country.

And now it may be asked, What am I complaining about, and what do I want? To the first query my answer, as I have tried to point out to you, is, The maladministration of public health affairs. As to the second, I may as well be honest and admit that I am afraid I want a good deal more than I am ever likely to see accomplished in my lifetime, and this for reasons that may become obvious later on.

I am pleading, as I have before said, for the establishment of a great State Department of Public Health, with a special Minister attached, for a separate and distinct Government service which

shall take upon itself the whole sanitary administration of the country, which shall concern itself alone with this and other matters hereinafter to be mentioned. For I think no one will be bold enough to contend that the present system is a success, weighted down as it is with work which has enormously increased during the last few years—valuable and useful work, too, but which from want of arranging and systematizing is capable of producing little or no result, from which the country derives but scant benefit and the public health little or no improvement.

I dare say none of you, except those specially interested, have ever taken the trouble to read the regulations issued by the Local Government Board for the guidance of medical officers of health, dated 1872. I will not read them to you in detail, for though art be long, yet life is short; but they impose duties of a most comprehensive character, and their proper fulfilment demands special knowledge, which under the present conditions is in few cases obtainable. These appointments are, for the most part, held by men who are deeply engaged in other professional work; the remuneration in most cases is far from princely, varying on an average from £21 10s. in rural districts to £14 10s. in urban, and the medical officer of health, being but human, is apt in too many instances to preach according to his stipend. Further, he has strong local influences to contend with, and a conscientious discharge of his duty is nearly certain sooner or later to bring him into collision with certain of his authority, with the result of resignation or dismissal.

But if the conditions required and imposed upon a medical officer of health by the Order of 1872 were exacting, and if properly carried out trespassed so much upon his time, in return for which, as we have already seen, he is not in some cases allowed even the wages of a common labourer, how much less is he able to cope with the added legislation which the last few years have placed upon the sanitary statute-book! What, it may be asked, are the two most pressing sanitary questions before the country at the present time? Clearly, I think, the prevention of consumption and the better housing of the working classes. Both questions are intimately connected with each other, are problems of the very highest importance, and ought to bear heavily, provided they are handled in an active and energetic manner, on the time at the disposal of the medical officer of health. The housing question specially demands, and is likely soon to receive at the hands of the Legislature, increased attention. The Housing of the Working Classes Act of 1890 is cumbrous to a degree, and the Bill which the present

Government have introduced hardly touches this great question at all. It is useless to expect medical officers of health under existing circumstances to tackle this subject with any prospect of success. A burning of one's fingers is likely to be the nett result, and probably a curt intimation that it would be better to leave it severely alone.

And this brings me to the question of the further obligations of the State in matters of public health.

In this direction I regret to say that so far the tendency of successive Governments has been to relieve themselves as much as possible from further responsibility, and to devolve the powers upon county councils, parish councils, and the like.

By the Local Government Act of 1888 it was enacted that county councils might, if they deemed it expedient—note the language used—appoint medical officers of health for each of their counties. The matter was left entirely optional, and what has been the result? At the present time some twelve counties have availed themselves of the powers granted by the Act, while the rest have either deemed it inexpedient to make any change in the present existing unsatisfactory conditions, or have contented themselves by having the returns tabulated for them, and there the matter ends. This very county in which we are adopting this practice, and even refuses an increase of salary to the gentleman it deputed to do the work.

It cannot be maintained that there is not sufficient work to keep a county medical officer in healthy work, or that the present administration of sanitary affairs is so perfect that it needs no improving. The answer must be sought for in another direction, and is to be found in the feeble, supine manner in which matters of public health are regarded by many of these local authorities, and by the so-called spirit of economy meted out to this special department of the work. How, I ask, is all this to be altered?

In the first place, as I have said, by educating public opinion, and this, I think, is work in which this association may well take part; by impressing upon our representatives in Parliament, and through them the Government of the day, our determination to have a State Board of Health, presided over by a Minister of Public Health, himself a member of the medical profession, whose selection should be due to his transcendent professional abilities, and not to his political leanings. I suppose for want of a better system we must continue to have government by party, but personally I am not in favour of this Minister being influenced by the rise and fall of each successive Government, for this would necessitate such constant changes in the management of the department as would be detrimental to its best interests. The appointment, once made,

should be *aut vitam aut culpam*; but a limitation as to age might be agreed upon, so that retirement could be induced at a given time.

A Minister of Public Health and a State Board of Health—what is to be the function of this latter? Briefly, it must concern itself with all matters relating to the public health of the community, with all that is known at the present day by the name of Hygiene, with this further addition, which appears to me desirable—that each county medical officer of health should be superintendent registrar for the district under his control, and in criminal cases have the conduct of post-mortem examinations. I shall not be surprised if this latter suggestion meets with some adverse criticism at your hands, but I have very little doubt in my own mind that the present system is unsatisfactory, and I can see no difficulty why special training for such work should not be included in qualifying for admission into this special service.

Having supplied herself with a capable Minister, the State should attract and attach to her service in the meantime at least, say, twelve of the leading medical sanitarians of the day, the same to constitute the Board, these twelve to have respective districts assigned to them over which they are the heads, and for the administration of which they would be held to be responsible. Further, the Board must have the power of insisting upon every county in England supplying itself with the services of a thoroughly competent and well-trained official, whose qualification in the meantime at least should be that he has provided himself with a diploma in State Medicine. In the course of time, I should prefer to see the Board institute an examining body, where the standard shall be uniform, and where every practitioner who cares to devote himself to the work, and can satisfy the examiners as to his efficiency, shall be enrolled in the department, and shall be eligible for such appointments as may occur. In the case of county councils (and, as I have already shown, they are many) which have not up to the present time provided themselves with county medical officers of health, or in the event of any vacancy occurring in those already supplied, the Board should take upon itself the appointing of the same, having, as before stated, satisfied itself as to the capabilities of the individual with whom their selection rests, and such appointment ought to be *aut vitam aut culpam*, dismissal or retirement being subject to the authority of the State Board of Health.

During the present session of Parliament an attempt was made by Dr. Farquharson to get through the House a Bill which was of special interest to medical officers of health and inspectors of

nuisances, inasmuch as it aimed at fixity of tenure, but for the present at least its further progress is blocked. I confess that at first I was much enamoured of the said Bill, and felt inclined to give it my hearty support. But on further thinking out the scheme, which I now lay before you, for an entire re-arrangement of the public health service of this country, it seemed to me desirable to approach this question of fixity of tenure from a different direction than that contemplated in the Bill. I am, as you may have gathered, quite as much in favour of fixity of tenure as Dr. Farquharson, both for medical officers of health and inspectors, but subject to certain conditions. I am quite aware that the said conditions would affect my own position, and that failure to fulfil them would necessitate my own retirement from the public health service. But I cannot help this: one's duty to the community, of which, after all, one is only a small part, must ever exceed one's duty to one's self, though it is said that self-preservation is the first law of Nature. And what are these conditions? Simply compliance with the requirements of the State Board as to admission into the service, and then fixity of tenure by all means on the lines I have already laid down. Let it be clearly understood by this Board, which in a short time would be able to regulate its examinations by supply and demand, as is done in the medical departments of the army and navy, that admission into its service would bring a salary of, say, not less than £250 a year for a start, with the prospect of increase as promotion came, and I am certain the State would have no difficulty in attracting and attaching many of the best young practitioners, who at the present time stand back disgusted with the competition, which becomes keener and keener every day, for even the most ill-paid sanitary appointments. Fancy the services of a gentleman to act as whole-time medical officer of health, medical officer to the infectious hospital, and surgeon to the police, being asked for at an inclusive salary of £200 a year! What trades union would stand such a state of things? The State Board should also take upon itself to regulate the standard of efficiency for sanitary inspectors. These might well be increased in most districts, and extended powers given them as soon as it was determined they were capable of administering the same.

I have thus shown you—somewhat hurriedly and imperfectly, I fear—how, in my opinion, the State might more intimately and with better results than are at present obtained connect itself with this subject of public health. And you may remember that I was candid enough at the outset to express the opinion that I wanted a good deal more than I was ever likely to see accomplished in my

lifetime, at least. The why and wherefore now becomes apparent to you. It is not only a question of money, for when the public health of a nation is concerned, this should and ought to be got over; but it means a transference, so to speak, of the spending of much of that money from local authorities (who are jealous of the patronage which this affords them) to a central Board, over which these same would have little or no control. This seems to be a putting back of the hands of the political clock with a vengeance. I admit all this and something more, for I want this matter removed from all political and party strife. Government for the people, most certainly yes, but by the people in this case and at the present time, most assuredly not yet. Where is the Ministry to be found that dare risk such an experiment? I confess I do not know, though the benefits to be derived appear to me to be incalculable. You gain, in the first place, a distinct Department of Public Health, presided over by a Minister, himself a skilled member, and you bring the whole sanitary administration of the country into closer touch. The medical inspectors give advice and counsel to the county medical officers, these transmit it to their subordinates, and the whole machinery moves like clockwork. Reports which are now thrown into the waste-paper basket would become valuable, suggestions and improvements as to public health would be carried out, and the general well-being of the community would be benefited thereby. By the adoption of the system which I have feebly tried to sketch out for you, the State Board of Health could at a moment's notice inform itself as to the general sanitary surroundings and state of public health in any district, strengthen what was weak, and, without waiting for the panic induced by epidemic disease, continue to push forward the good work of sanitation.

A medical officer of health who, as at present, is hampered and beset by local influences and considerations soon gets to know that he cannot get much of the work in which he is interested carried out, and if he is a wise man he bows to the inevitable, and ceases to kick against the pricks. This, it may be said, sounds very much like making unto one's self friends of the mammon of unrighteousness, and yet, I regret to say, it is the inevitable outcome of the system, or the want of system, he is forced to carry out. There are not a few martyrs, it would be found if the matter were inquired into, whose excess of zeal in public health affairs has led to retirement or dismissal. It is this argument mainly which is at the bottom of the agitation for fixity of tenure which finds expression in Dr. Farquharson's Bill, but this same, unless the conditions are altered, will not, in my opinion, solve this question

of public health. What is wanted is a modern Hercules to sweep clean the whole stable. Query, is such a one likely to arise?

Most of us, I dare say, considering the present tone and temper of public affairs, would be inclined to answer in the negative. And yet we need not despair. When the poet sighed and sang for "the coming of that glorious time," the question of free education was far removed from the region of practical politics, and yet to-day it is an accomplished fact. The progress of social evolution in the future must, as Mr. Kidd says, be more and more in the direction of bettering at the public expense the condition of the lower class of workers, and this can only be done by State interference and State control. That other countries feel the same want and are alive to the importance of this question is evidenced by the account of the proceedings at the Health Conference in America, held in Atlantic City, New Jersey, on the 1st of this month. Dr. Wingate, the president, delivered an address on the subject of a National Commission of Public Health, and expressed the opinion that some organization separate and apart from any other service, devoting its entire time to a consideration of the public health, and presided over by a competent member of the medical profession, should be created by Congress.

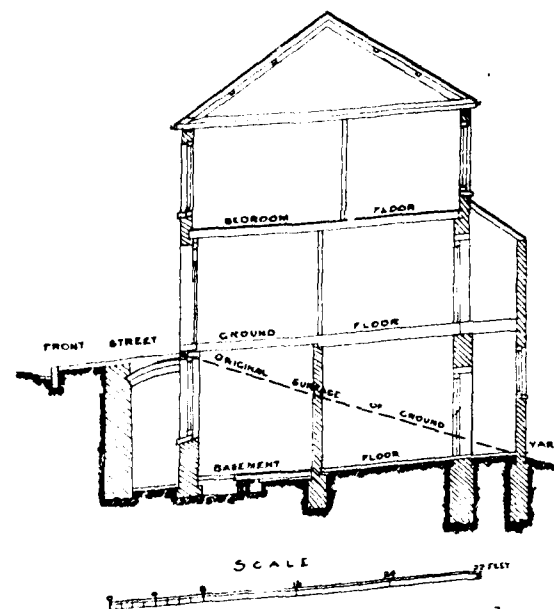
Meantime, education and agitation are the two main factors to which we must look for hope. To this end and towards the development of a great State service of public health this association may render great and useful help, and it is with this purpose mainly in view that I have ventured to bring this matter before you. To most of you who are unconnected with public health work I must apologize for offering you what must be a dull and uninteresting paper; and to all I would tender my best thanks for the patient hearing you have given me.

THE SALE OF POISONS.—The *London Gazette* of August 1st contains an announcement that the Lords of the Privy Council have approved a resolution passed by the Council of the Pharmaceutical Society of Great Britain declaring that liquid preparations of carbolic acid and its homologues containing more than 3 per cent. of those substances (except any preparation prepared for use as sheep-wash, or for any other purpose in connection with agriculture or horticulture, and contained in a closed vessel, distinctly labelled with the word "Poisonous," the name and address of the seller, and a notice of the agricultural or horticultural purpose for which the preparation has been prepared) ought to be deemed poisons within the meaning of the Pharmacy Act, 1868, and ought to be deemed poisons in the second part of Schedule A of the said Pharmacy Act, 1868.—*Law Journal*.

UNDERGROUND ROOMS (CELLAR DWELLINGS).*

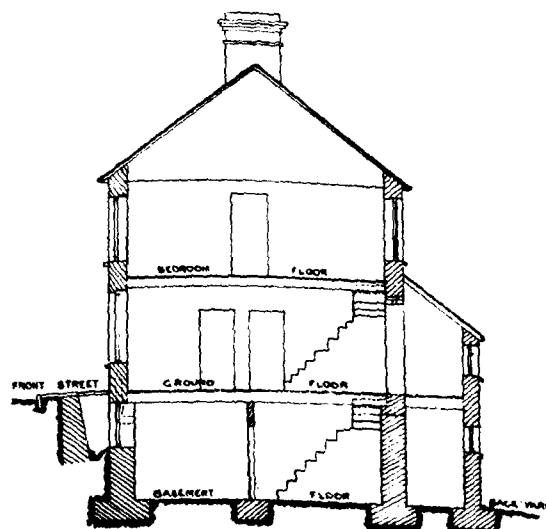
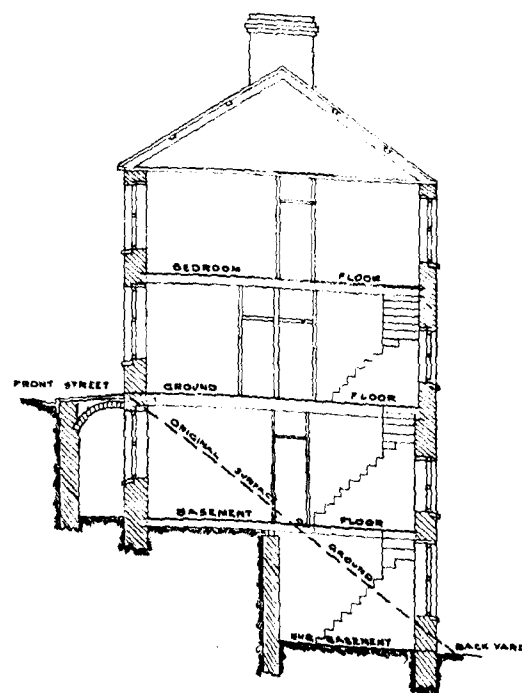
By HERBERT JONES, D.P.H.,
Medical Officer of Health of Rhondda.

SECTION 67 of the Public Health Act, 1848, provided that no vault, cellar, or underground room built or rebuilt after the passing of that Act, which at the date of the passing of the Act was not so let or occupied, should be let or occupied separately as a dwelling. That Act was repealed by the Public Health Act of 1875, but the provisions of Section 67 were re-enacted. The Act of 1848 required all churchwardens and overseers of the poor to give public notice



of the provisions with respect to the letting and occupation of cellars in such a manner as should appear to them to be best calculated to make those provisions generally known. This obligation was not enforced by the 1875 Act, and it may be due to this circumstance that in many parts of the country cellar dwellings are let and occupied in spite of the restraining sections of the Act of 1875. In hilly districts it is not at all unusual to find houses built with a "basement" floor, which is let off and occupied as a separate dwelling. The floor of the basement-room under the ground-floor back-room is on a level with the ground at the back

* Read before the West of England and South Wales Branch of the Incorporated Society of Medical Officers of Health, July, 1900.



of the building, and may have an ample open space before it, but the basement-room under the ground-floor front-room has its ceiling on a level with, or even below the level of, the adjoining ground, and has no opening to the external air, except perhaps by means of a grated area. There can be no doubt as to the unhealthiness of such a room, but is it a "cellar" within the meaning of Section 71 of the Act of 1875? The accompanying drawings explain more clearly the position which the rooms occupy in respect to the adjoining ground.

An "underground room" is defined in the Public Health (London) Act, 1891, as "any room the floor of which is more than 3 feet below the footway of the adjacent ground." The dictionary meaning of the word "cellar" is given as "a vault or place under a ground where liquors or stores are kept," and "a room under a house or other building either wholly or partially under ground not adapted for habitation, but for the storage of provisions, wine, lumber, fuel, etc."

FORMALDEHYDE IN MILK.—J. Moechel has a paper on this subject in the *Kansas City Medical Record*, of which the *Journal of the American Medical Association* publishes the following abstract: Moechel is strongly in favour of the use of small quantities of formaldehyde as a milk preservative. His experiments were made on not only animals, but human beings, and therapeutic experiments on children. As a result he believes the proper percentage of formaldehyde should be allowed to be a benefit rather than deleterious in milk, and that it is much better than the process of pasteurization, which destroys the amylolytic property possessed by raw milk, modifies the butter-fat, and changes milk-sugar into caramel. The reasons he gives for his opinion in favour of formaldehyde are: "1. It does not interfere with the human gastric, intestinal, or ptyalin digestion. 2. Infants with the human gastric, intestinal, or ptyalin digestion, also that did not prosper with various kinds of infants' food and milks, also cow's milk prepared according to the best authorities, at once changed for the better when supplied with milk treated with formaldehyde—insignificant amount, 1 to 150,000, and not more than 1 in 50,000, preserved the milk from souring for a few days. Whether the same percentage destroys the bacteria or inhibits their growth will be shown by further investigations, now under way. Formaldehyde is the best milk-preservative, and does not introduce any mineral matter. These conclusions are preliminary, as our conclusions are not yet finished, but they are based upon strong facts, which we obtained from experiments made by us up to the present time. In order to prevent decomposition of milk, we regard it as entirely admissible to add formaldehyde (pure) in proper quantity after milking, and not later, and therefore by the only permissible person, the dairyman." The proper proportion of formaldehyde seems to be about 1 in 80,000, according to the results of experiments in feeding reported to Moechel by Dr. F. W. Froehling, who conducted this part of the investigation.—*Food and Sanitation*.

RESULTS OF VACCINATION ACT OF 1898.

On the application of Mr. T. W. Russell, late Secretary of the Local Government Board, a return has been prepared by that Board "showing in respect of each Poor Law Union in England and Wales (1) the number of certificates of conscientious objection under Section 2 of the Vaccination Act, 1898, received by the vaccination officers, which were dated between the 1st day of January and the 31st day of March, the 1st day of April and the 30th day of June, the 1st day of July and the 30th day of September, and the 1st day of October and the 31st day of December respectively in the year 1899; and (2) the number of certificates of successful primary vaccination received by the vaccination officers during the periods between the 1st day of January and the 30th day of June, and the first day of July and the 31st day of December respectively in the years 1898 and 1899."

The return (H. C. 354, Session 1900) comprises twenty-nine foolscap pages of statistics, which are succinctly summarized in the memorandum which precedes the tables.

Memorandum.—Section 2 (1) of the Vaccination Act, 1898, provides that no parent or other person having the custody of a child shall be liable to a penalty under the Vaccination Act, 1867, if, within four months of the birth of the child, he satisfies two justices, or a stipendiary or Metropolitan police magistrate, that he conscientiously believes that vaccination would be prejudicial to the health of the child, and within seven days thereafter delivers to the vaccination officer for the district a certificate by such justices or magistrate of such conscientious objection. The section came into operation on the passing of the Act, i.e., the 12th August, 1898, but in its application to a child born before the passing of the Act there was substituted for the period of four months from the birth of the child the period of four months from the passing of the Act.

A Parliamentary return (No. 89, H. C., Session 1899) showed that between the date of the passing of the Act and the 31st December, 1898, the number of certificates of conscientious objection received by the vaccination officers was 203,413, and that the number of children to whom such certificates related was 230,147.

The present return (Part I.) shows that the numbers of certificates of conscientious objection received by the vaccination officers and dated between 1st January and 31st March, 1st April and 30th June, 1st July and 30th September, and 1st October and 31st

December in the year 1899, were 6,703, 8,403, 9,082, and 8,153 respectively, making a total of 32,341 certificates. They related to 32,357 children.

The following is an analysis of the figures given in the return:

Unions in which the Children exempted from Vaccination on Certificates of Conscientious Objection numbered	Number of Unions.	Per cent. of Unions in England and Wales.	Population of Unions (1891).	Percentage of Total Population of England and Wales.	Total Number of Children exempted.	Number of Children exempted per cent. of Births in the Year 1899.
Less than 100 ...	565*	87.2	21,280,431	73.4	13,435	1.99
100 to 500 ...	77	11.9	6,827,220	23.5	14,450	6.28
Above 500 ...	6	0.9	892,963	3.1	4,472	16.88
Totals... ..	648	100	29,000,614†	100	32,357	3.48

The return (Part II.) shows that the total numbers of certificates of successful primary vaccinations received by the vaccination officers during the periods 1st January to 30th June, and 1st July to 31st December, in the years 1898 and 1899 respectively, were as follows:

Jan. 1st to June 30th, 1898.	July 1st to Dec. 31st, 1898.	Jan. 1st to June 30th, 1899.	July 1st to Dec. 31st, 1899.	TOTALS.	
				1898.	1899.
277,839	222,475	355,552	313,797	500,314	669,340

The increases in the numbers of vaccinations for the half years of 1899 as compared with the corresponding half-years of 1898 were, therefore, 77,713 and 91,322 respectively, a total increase for the year of 169,035, or 33.8 per cent.

The number of births registered in England and Wales during 1898 was 923,265, and during 1899 was 928,640. The ratios per cent. of successful primary vaccinations to births registered were 54.2 in 1898 and 72.1 in 1899, an increase in ratio of 33 per cent. in 1899 as compared with 1898.

* These 565 Unions include 21 in which no certificates of conscientious objection were given.

† The population of England and Wales in the middle of 1899, as estimated by the Registrar-General, was 31,742,588.

HOUSING OF THE WORKING CLASSES.*

By T. ORME DUDFIELD, M.D.,
Medical Officer of Health of Kensington.

In 1890 the London County Council formulated a scheme under the powers of the Housing of the Working Classes Act, 1890, known as the "Boundary Street Scheme," dealing with an area mainly in Bethnal Green (a small part of the area is in Shoreditch), which originated with the Medical Officer of Health of the former parish, who made an "official representation," under Part I. of the Act, that the slum in question was an "unhealthy area." It was stated at the time that the annual rate of mortality in the four years 1886-89 was 40, and the zymotic death-rate 8.6 per 1,000. The rate of infantile mortality was also high. The density of the population was 373 per acre. The area was 15 acres in extent, the streets 20 in number, ranging in width from 20 to 28 feet. There were also many small courts of a very bad class. The houses were 730 in number, of which 652 were occupied, wholly or partly, by persons of the working-classes. The population, exclusive of persons in two registered lodging-houses, was 5,566—viz., 3,370 adults and 2,196 children, in occupation of 2,545 rooms. Including those in the lodging-houses, the number of persons of the labouring classes displaced was 5,719, in about 860 families. The estimated net cost of the scheme was £300,000, of which about one-eighth part would fall on the City, one-sixteenth part on Kensington, and one-eightieth part on the parish mainly benefited.

The scheme has now been carried through to completion. Details of the work are set out in a pamphlet prepared, by the Clerk of the County Council, in anticipation of the recent opening ceremony by H.R.H. the Prince of Wales. From this we learn that "the area is approached by an avenue 60 feet wide, leading direct from Shoreditch High Street to a central open space"; that "streets 50 feet wide, planted with trees, radiate from this centre to the limits of the area, these streets being connected with the streets bounding the area by branch streets 40 feet wide"; whilst "the four streets bounding the area have been widened to 40 feet." Upon the building sites created, "blocks of dwellings have been so arranged that the living-room of every tenement receives the benefit of sunlight at some time during the day." Twenty-three blocks of dwellings have been erected, providing

* In part from Report for the four weeks ending March 31st, 1900.

accommodation for 5,380 persons, in 15 flats of one room, 533 of two rooms, 388 of three rooms, 98 of four rooms, 7 of five rooms, and 3 of six rooms. "There are thus 925 tenements now in lieu of the 730 houses formerly existing on the area." A central laundry has been provided: the laundry building contains baths and two good-sized club-rooms. Baths with hot and cold supply of water have also been provided in one of the blocks of buildings. "Between the various blocks of buildings there are large paved yards, which form playgrounds for the children, and one of these is laid out as an ornamental garden." A central open space, circular in shape, is formed in terraces and provided with seats, shrubs being planted on its slopes. Seventy-seven workshops and eighteen shops have been built for the use of the occupants of the buildings. A central workshop is also provided and fitted for the execution of works of repairs on the estate. It is stated that "the aim has been that the dwellings, while let at rents not exceeding those ruling in the neighbourhood, shall be so designed as to be self-supporting." The rents are to be "sufficient to pay all out-goings, including interest on the capital expended on land (at its value for housing purposes, £63,010) and buildings, and the provision of a sinking-fund for the repayment of such capital within a period of sixty years."

Obviously, a great local improvement has been effected by the Council. Comfortable homes, moreover, have been provided for nearly as many persons as were evicted. But it is questionable if any of these unfortunates are to be found amongst the occupants of the flats. What has become of them? One asks in vain. But it may safely be assumed that many have gone to increase overcrowding in other already overcrowded slums. It is always so. The late Metropolitan Board of Works carried out some twenty-two schemes of a similar sort; 59 acres of land were acquired and cleared, on which accommodation was provided for upwards of 38,000 persons. The amount expended exceeded a million and a half sterling (about £40 per head), this amount being irrespective of the outlay on model dwellings erected on some of the cleared sites by bodies like the Peabody Trustees. The Board, after taking steps for giving effect to eight additional schemes, stayed proceedings on account of the tremendous cost to the ratepayers that would have been involved in carrying them into effect. It was alleged that a third part of the cost of acquiring sites was due to the excessive valuation of property so bad that demolition was the only possible remedy for the evils to which it gave occasion.

When describing the Boundary Street Scheme at the time of its inception, I said it was to be feared that the cost would be even

greater, relatively, than that of the aggregate of schemes carried through by the Metropolitan Board. We now learn that the cost of purchasing the slum properties, and the value of the land, was £333,000, or about £60 per head of the displaced population (5,566). The families turned out were 860, the expenditure on properties and land was therefore equal to £387 per household. For a smaller outlay, I remarked in 1890, "freehold cottages and gardens might be provided, a little way out of London, and handed over, free of cost, to the dispossessed people, whose travelling expenses to and fro would amount to far less than they now pay in rent for the dens in which they rot, and will have to pay for the rent of rooms in the new dwellings—should they ever set foot therein." But, as already said, the old tenants do not return. The scheme is admirable in itself, but it contributes in no appreciable degree to the solution of the difficulty of housing the poor, a difficulty never likely to be effectually dealt with under Part I. of the Act of 1890; but which might possibly be to some extent solved under the provisions of Part III., should Parliament ever see fit to enable the borough councils of the near future to acquire slums at their proper value—that is, the value of the land as housing sites, plus the value of the materials of the buildings thereon. There is the more reason for a drastic measure of this sort, as it would appear that the Council, staggered at the cost of acquisition of properties, is little likely to undertake other such large and expensive schemes. The Council would not entertain the request of the Vestry of Kensington to deal with its "Special Area" (no slum!) under Part III., though there was every reason to believe that the properties proposed to be acquired as lodging-houses might have been purchased on terms to yield a good profit in rent, and although the death-rate of the district very far exceeded that of the Boundary Street area (40 per 1,000), a rate which was deemed to justify the gigantic outlay on the scheme made at the charge of the Metropolis generally, mainly for the benefit of Bethnal Green and Shoreditch.

The pamphlet relating to the Boundary Street area already referred to contains information with respect to other schemes completed, or in course of execution, by the Council. It is stated that in the clearance only of insanitary areas the Council is spending £1,114,800, for which some 35 acres of old, dilapidated, and insanitary dwellings will be demolished, and 16,160 persons will be displaced. About 1,900 tenements, affording accommodation for 10,060 persons, are already completed and occupied; these buildings, including the value of the land, have cost a sum of £609,438.

Nearly 1,200 tenements, affording accommodation for 5,900 persons, are in course of construction, at a cost for building, including value of land for housing purposes, of £327,000. Plans, moreover, are being prepared for 3,718 tenements, for 19,990 persons, at a cost for buildings and land estimated at £1,008,799. In all, the Council has provided, or is providing, accommodation in 6,816 tenements, for 35,950 persons, at a total outlay of £1,945,277. Further, 5,251 persons will be accommodated in areas about to be cleared; but the cost of this work has not yet been estimated. In the aggregate of the schemes, it is stated, buildings equivalent to a town of nearly 36,000 inhabitants, that is, of the size of Macclesfield, in Cheshire, will have been constructed at an expenditure of nearly two millions sterling—say, £55 per head of the population housed.

Some of the improvements carried out comprise very limited areas, and possibly proceedings could have been taken under Part III. of the Housing of the Working Classes Act, 1890, which consolidates and amends the Acts 1851 to 1885, commonly known as Shaftesbury's Acts, its object being the provision of suitable houses and cottages for the working-classes, whether by acquiring land and erecting new buildings, or by the purchase of existing lodging-houses by the "local authority." The Kensington Vestry, on more than one occasion, as already stated, requested the Council to purchase the lodging-houses in the "Notting Dale" special area with this object. The future Borough Council of Kensington will be a local authority under the Act, and will have power to purchase, and arrange for the management of, the houses under bye-laws—as explained in the Annual Report for 1897.

Under Part I. of the Act special provision is made (in Sec. 21) as to compensation, with the object of limiting the amount to be paid for a house or premises, the rental of which had been enhanced by reason of the same being used for illegal purposes, or in case of the premises being so overcrowded as to be dangerous or injurious to the health of the inmates; or in such a condition as to be a nuisance; or in a state of defective sanitation; or not in reasonably good repair. Should the house or premises be unfit and not reasonably capable of being made fit for human habitation, the compensation to be awarded by the arbitrator is based on "the value of the land, and of the materials of the buildings thereon." Under Part III., however, it would appear that, in the present state of the law, whatever the condition, or the mode of occupation, of the houses acquired, full compensation, with allowance for compulsory purchase, has to be awarded, a defect in the law which seems to

call for amendment. The Housing of the Working Classes Committee of the Council are at the present time taking steps to obtain certain amendments of the Act, in connection with a Government Bill, introduced into the House of Commons by the President of the Local Government Board, but dealing with Part III. only, in the direction of enabling a local authority to establish or acquire lodging-houses outside its district. The Bill does not touch the question of compensation.

All that has been here said goes to show the practical impossibility of giving effect to the provisions of the Act, under Part I., to any adequate extent, excepting at a prohibitive cost. The most hopeful plan for dealing with the question of the housing of the working-classes would seem to be that of bringing about a reduction of rents in town, by bringing the country into competition, by the erection of cottages, and by increased travelling facilities, a subject to which attention has been called in these reports on more than one occasion, and long ago. The Government Bill for the amendment of Part III., above adverted to, would seem to afford an opportunity for trying the experiment.

DISINFECTION BY STEAM.—Owing to the fact that observations at one of the United States Quarantine Stations had shown that steam introduced into cylinders under pressure, but without continuous outlet, left "dead spaces" of less than 212° F., and penetrated pillows, mattresses, etc., very slowly, Dr. H. R. Carter, U.S.M.H.S. (*Public Health Reports*, April 27th, 1900), attempted to remedy the defects by freely turning on a considerable head of steam and allowing it to escape. He found that articles penetrated slowly by still steam were penetrated rapidly by flowing steam. Wads of cotton-quilts were the most difficult to penetrate, and feather pillows the next; mattresses and blankets under any condition of roll or wad were penetrated very readily. The preliminary use of a vacuum was found to hasten penetration materially, and to offer very considerable advantages when it is desirable to lay fabrics flat or to pack a large amount of clothing in the chamber at one time. When the articles are very closely packed, a second and even a third vacuum, followed by steam under pressure, may be used to insure greater penetration; but, as a rule, close packing results in getting the fabrics out in too wet a condition for vacuum is employed. When they are loosely packed they dry as well, or nearly so, with flowing steam as when the drying vacuum is used. With plenty of room for a large chamber, and when the articles handled are chiefly seamen's clothes and bedding, the method with flowing steam is probably the best, since little skill is needed, and each owner unpacks and repacks his baggage; but for passenger work, when room is scarce and the work heavy, the vacuum offers very great advantages, and with care gives far better results.—*Amer. Journ. Med. Sciences.*

DEMOLITION OF INSANITARY PROPERTY.

HOUSING OF THE WORKING CLASSES ACT, 1890.

GOVER V. THE VESTRY OF ST. GEORGE THE MARTYR, SOUTHWARK.*

ON November 29th, 1898, an order was made by the Vestry of St. George the Martyr, under the Housing of the Working Classes Act, 1890, for the demolition of the premises Nos. 1, 2, 3, 4, and 5, Red Cow Alley, Tabard Street, in consequence of the same not having been rendered fit for human habitation, and being dangerous or injurious to the health of the inhabitants of the neighbouring dwelling-houses.

Against this order the owners of the property, Messrs. Gover, appealed to the Court of Quarter Sessions, and the appeal was heard at the Newington Sessions House on January 11th, 1899. Mr. Corrie Grant appeared for the Vestry, and Mr. Frank Gover for the appellants. After hearing Dr. Waldo and Dr. Parkes, the Court considered that no further evidence was necessary to prove that the premises were dangerous or injurious to the health of the inhabitants of the neighbouring dwelling-houses.

The witnesses for the appellants having been heard, Mr. Gover contended that the words "dwelling-house" in Section 33 meant an "inhabited" dwelling-house in accordance with the definition contained in Section 29 of the Act, and that only so much of the buildings could be ordered to be demolished as was dangerous or injurious to health. The Court decided that the premises were in such a condition as to be dangerous or injurious to the health of the surrounding population; but they came to the conclusion that in Section 33 the words "dwelling-house" meant an "inhabited" dwelling-house in accordance with the definition contained in Section 29.

On the application of the Vestry, a case was stated for the decision of the Queen's Bench Division.

The case was heard in the Divisional Court on November 7th, 1899, by Mr. Justice Ridley and Mr. Justice Darling. Mr. Corrie Grant appeared on behalf of the Vestry, and Mr. A. Macmorran, Q.C., on behalf of Messrs. Gover. In the course of his argument Mr. Macmorran supported the contention of Mr. Gover in the Court of Quarter Sessions that the words "dwelling-house" in Section 33

* The history of this extraordinary case is taken from a report presented by the Public Health Committee to the Vestry of St. George the Martyr, Southwark, at the meeting of April 24th last.

applied only to an *inhabited* dwelling-house. He also contended that it ought to have been stated in the special case whether the *whole* of the premises or *what part* was dangerous or injurious to the health of the public or to the inhabitants of the neighbouring buildings.

The Court were of opinion that the words "dwelling-house" in Section 33 of the Act applied not only to an inhabited but also to an uninhabited dwelling-house, but remitted the case to the Quarter Sessions "for re-hearing and determination for the purpose of ascertaining whether the whole of each of the five houses above mentioned, or some and what part of any or all of them is dangerous or injurious to the health of the public," etc., and an order of the Court was made accordingly.

The case again came before the Court of Quarter Sessions on January 19th, 1900. Mr. Gover then stated that the w.c.'s had been demolished and the drains sealed, with a view to render the premises not injurious to health, and the case was adjourned to February 16th, so that the Vestry might have an opportunity of inspecting what had been done.

Messrs. Gover having objected to the ground being disturbed, an appointment was made with them to inspect the premises on February 7th as they stood. On that occasion it was discovered that, although the closets had been pulled down, it did not appear that the drains had been properly sealed or removed, as stated by Mr. Gover. Notice was accordingly given by the Vestry, under the Metropolis Management Act, 1855, of their intention to open the ground to inspect the drains, with a view of ascertaining the correctness of Messrs. Gover's statement. The inspection took place on February 14th, when neither the drains at the back of the premises nor those at the front were found to be sealed or in any way dealt with.

The hearing of the case was postponed until March 16th, when Drs. Waldo and Louis Parkes again gave evidence on behalf of the Vestry. Dr. Louis Parkes stated, in the course of his evidence, that the drains having been removed, there was a much greater liability of danger to health arising, as the roofs were partly demolished and the interiors of the houses were rotten, and the rain passing into the filth between the floors and saturating the ground (which already no doubt had become the receptacle of a considerable quantity of filthy matter) would in warm and close weather give off dangerous effluvia, and, in his opinion, the houses ought therefore to be demolished. Mr. Field gave evidence on behalf of the appellants.

After hearing the evidence and the arguments of counsel, the Deputy Chairman stated that he would inspect the premises in view of the contrary opinions expressed by expert witnesses on each side, and that he would take with him a medical man who had been for some years a medical officer of health, and a practical surveyor of his acquaintance, in order to guide him in his judgment.

Mr. Loveland inspected the premises on the afternoon of Saturday, April 7th, Dr. Waldo acting as shower for the Vestry, and Mr. Field for Messrs. Gover. The names of the gentlemen accompanying the magistrate did not transpire.

Judgment was given by the Deputy Chairman on Wednesday, April 11th, in the following terms:

This is an appeal against an order of the Vestry of St. George the Martyr, Southwark, dated November 29th, 1898, under Section 33 of the Housing of the Working Classes Act, 1890, for the demolition of five houses, being Nos. 1, 2, 3, 4, 5, Red Cow Alley, Tabard Street, Southwark, which was first heard before me on January 13th, 1899, when Mr. Corrie Grant appeared for the Vestry and Mr. Gover for the appellants.

Dr. Frederick Joseph Waldo, medical officer of health, and Dr. Parkes gave evidence on behalf of the Vestry, together with the sanitary inspector and others.

Mr. Debenham, a rate-collector, was called by the appellants, who stated *inter alia* that no complaints as to sickness or a nuisance had been made regarding the premises.

Two tenants of Tabard Street were called on behalf of the appellants, who said they had no complaint, nor had they heard of any, and a surveyor was called also to state that he did not detect any smell of sewer-gas, nor did he see any filth about the place. One of the co-trustees stated that there was no intention of letting the premises, that they were mere ruins, they had not been inhabited since 1895, and there was no intention of making them habitable, but that the ground would be sold with the ruins as they stood.

Previous to the demolition order the premises were closed in pursuance of the closing orders made by the respondents under Section 32 of the said Act, on March 14th, 1895. The orders were not determined by any subsequent order, nor were any notices or complaints in respect of the buildings made by the respondents until the proceedings in this Court. The premises are all closed in, and the only access to them is now obtainable through a shop and back premises in Tabard Street.

The contention of the respondents was that the buildings were dwelling-houses within the meaning of the Act, and the continuation of the said buildings was dangerous or injurious to health, and that the said order of November 29th, 1898, was rightfully and lawfully made under the section in the Act.

The appellants contended that the building and premises were not dwelling-houses either within the meaning of the said section or of the said Act, that the continuance thereof was not

dangerous or injurious, and that even if they were dwelling-houses within the meaning of the Act, only so much of the said building could be ordered to be demolished as were (*sic*) dangerous and injurious to health.

We found, as a fact, at the time of the demolition order that part of the said premises were (*sic*) dangerous or injurious to health, and that the inhabitants of the neighbouring dwelling-houses might be affected thereby, and we settled a case for the opinion of the High Court as to whether Section 33 of the Act applied to inhabited premises which were not intended for occupation as dwelling-houses, and which were, in fact, mere shells or ruins, and we asked whether the respondents had power to make the said order for demolition of the whole premises under the terms of the section—in other words, whether this Act applied to property of this description.

The case came before the High Court, and an order was made, dated November 7th, 1899, to the following effect:

"Upon reading the order of Sessions made upon July 11th, upon the appeal of Elizabeth Gover and others against a certain order made by the respondents on November 29th, 1898, under Section 33 of the Act, for the demolition of certain houses known as Nos. 1 to 5 (inclusive), Red Cow Alley, whereby the said appeal was allowed, and the said order quashed, and a special case stated thereon, it is ordered that the said order of Sessions and the case stated thereon for the opinion of this Court be remitted to the Quarter Sessions for re-hearing and determination by such Court, for the purpose of ascertaining whether the whole of each of the five houses above mentioned, or some of them, and what part, if any, or all of them is dangerous or injurious to the health of the public, or of the inhabitants of the neighbouring buildings."

On January 19th in the present year the appeal came on for hearing in pursuance of the order of the High Court, and was postponed, and in February, owing to there being some misunderstanding with regard to the date of the hearing, and the appellants not having due notice by the officials of this Court when the respondents appeared, Mr. Gover for the appellants did not put in an appearance, the appeal was therefore again postponed, the solicitor for the appellants being present, and Mr. Corrie Grant having stated on behalf of the Vestry that they had not been able or allowed to inspect the premises, the Court ordered the solicitor for the appellant to allow them to see what, if any, works had not been done on the premises, and report to the Court at the next hearing.

Subsequently, on March 14th, evidence was taken as to the insanitary state of the buildings at the time when the demolition order was made, and the respondents produced similar evidence to that adduced by them on January 13th, 1899, when Dr. Waldo was of opinion that, although at such time there was no disconnection with the drain, and the w.c.'s were still existing, they had since been pulled down and the drains stopped and sealed, and that no communication existed in March, 1900, but that the ruins were still existing, and that the state of the roof and floors and the filth was such that if they became wet by rain, and dried by the sun, the buildings would give off injurious

effluvia which would be likely to be dangerous or injurious to the health of the public or the inhabitants of the neighbouring buildings. He suggested pulling down the buildings, draining the plot, and taking proceedings against people who threw over vegetable and decayed matter. This evidence was corroborated by Dr. Parkes, and he agreed with Dr. Waldo that the premises were dangerous to health at the time of the demolition order, the interiors of the houses were rotten, no roofs, and that the sides were covered by walls that would give off dangerous effluvia.

Mr. Field was called by the appellants, and stated that he had seen the premises during February and March, was present when the ground was excavated, was shown by Mrs. Dunn, an adjoining tenant, which way the drains ran. He stated that he found no trace of saturation. All connection with the drains at the back of Tabard Street was cut off. There was a surface-drain in the court, and the end was sealed up some 5 feet or more underground. He found no smell; but he had no medical experience, was only a sanitary surveyor. He further stated they were not slightly buildings, and if they were his he should pull them down, but not on account of their being dangerous to health.

Both learned counsel asked that the evidence given on the previous occasion might be taken as given at that hearing, to which the Court assented.

The Court was then asked to go and see the premises, and, in view of the contrary opinions expressed by the expert witnesses on each side, that the Court would judge for itself whether or not the whole or any part of these premises were dangerous or injurious to the health of the public.

The Court suggested that it would like to be assisted by a medical officer of health and a surveyor, and in accordance with that view a visit was made by the Deputy Chairman, accompanied by a medical man who had been for some years medical officer of health, and a practical surveyor of large experience in London. They visited the premises on Saturday, April 7th, and saw that the drains had now been sealed up, and that they were 5 feet or so below the surface, holes being left so that inspection could be made, and they visited each of the five tenements.

The Court is of opinion that at the time of the demolition order a part of the tenements, namely, the closets and the drains, were injurious to the health of the public and the inhabitants of the neighbouring buildings, but that now at last the danger arising from that portion had been remedied, and no risk is likely to ensue therefrom. With regard to the dilapidated ruins themselves—namely, the walls of the houses, the floors and staircases—the Court, having carefully gone into the question with the experts before mentioned, is of opinion that such portion of the property was not, nor is likely to be, dangerous or injurious to the health of the public or of the inhabitants of the neighbouring buildings, that portion being easily separable from the sanitary portion of the dwelling. Such being the case, the Court has to see what the High Court mandate orders them to do, and seeing that such order says, "That it is to see whether

the whole of each of the said houses, or some, and what part of any or all of them is dangerous," etc.,

We, under the present circumstances, cannot order now any further demolition or work to be done on the property; but, having regard to the state of the premises at the time when the order was made, and if we are allowed so to do by the order of the High Court, and seeing that there was danger then, and that the unsanitary state of things was not amended for a considerable time, and that the appellants put many obstacles in the way of the respondents going upon the site to see the state of the property; and also having regard to the correspondence that passed between the parties, and bearing in mind that the order refers to the total demolition of the ruins, as well as such portion at the back which in their opinion was dangerous to health, the Court thinks that there should be no costs on either side.

It, therefore, need only be remarked upon this question of costs, that the Court has not forgotten the facts with regard to the appointed hearing, when Mr. Gover did not come to Court on behalf of his clients; but it thinks that probably that was due to insufficient notice, and that, although it was not the fault of the respondents, probably it was due to some inadvertence of the officials here, and therefore it would be unfair to give the respondents the costs of that appearance.

The Court has taken all these several circumstances into account in coming to the conclusion on the question of costs.

The Committee conclude their report with the following remarks:

"Your Committee were somewhat surprised that the Deputy Chairman of Quarter Sessions should have taken the exceptional course of accepting the statements of two of his personal friends on so important a case, as against the opinion of medical men of the eminence and experience of Dr. Parkes of Chelsea, and the medical officer of health of this parish, especially as there was no opportunity for counsel to cross-examine them before judgment was delivered.

"Your Committee are advised by Mr. Corrie Grant that there is in this case, unfortunately, no appeal from the decision of the Quarter Sessions.

"The Committee would, in conclusion, point out that the effect of the decision of the learned Deputy Chairman is practically to prevent the carrying out of that portion of the Housing of the Working Classes Act which purports to enable local authorities to demolish dwelling-houses closed by order of the magistrates, inasmuch as it is next to impossible to discover any case of a dwelling-house more likely to be a danger to the inhabitants of the surrounding dwelling-houses than those in this case."

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

Birmingham and Midland Branch.—A meeting of this Branch was held at the Council House, Birmingham, on July 19th. There were present: Dr. Mabyne Read (President), in the Chair, Drs. Hill, B. Hill, May, Reid, Fosbrooke, Bailey, Clendinnen, and Manley.

MINUTES.—The minutes of the preceding meeting, having been read and confirmed, were signed by the President.

CORRESPONDENCE.—The SECRETARY read letters which had passed between himself and Dr. Barwise with a view to a notice of motion and other matters. It was finally resolved that an early date be fixed after the Annual Meeting for the discussion of the motion.

ELECTION OF OFFICERS.—The Officers of the Branch were then elected, as follows:

President, 1900-1901: DR. RICHMOND (Handsworth, Staffs.).
1901-1902: DR. SNELL (Coventry).

Vice-Presidents: DRs. A. HILL and HENRY MAY.

Council: DRs. BARWISE, BOOBYER, FOSBROKE, HOLLINSHEAD, MALET, READ, and REID.

Treasurer: DR. BOSTOCK HILL.

Secretary: DR. HERBERT MANLEY.

Representatives on Council of the Incorporated Society: DRs. BOSTOCK HILL and REID.

ANNUAL MEETING.—The SECRETARY pointed out that the date of this meeting fell in the Birmingham Musical Festival week, and it was resolved that, subject to the convenience of Dr. Richmond, the meeting be held on Thursday, October 18th.

"DIARRHŒA" CLASSIFICATION.—The SECRETARY read a letter from the Hon. Secretary of the Incorporated Society relative to the distribution of memoranda for the better registration of deaths from diarrhœa. A long discussion took place, and it appeared to be the opinion of those present that this would be regarded by many practitioners as beyond the duties of the medical officer of health, and would lead to some friction. It was eventually proposed, seconded, and carried *nem. con.*:

"That this Branch, while approving of the proposal to make known among general practitioners the resolutions arrived at regarding the registration of deaths from diarrhœal diseases, strongly disapproves of the suggestion that the Society of Medical Officers of Health should be the medium of communication. The Branch is further of opinion that the proposed circular to practitioners should be sent out by the College of Physicians or the British Medical Association."

Northern Branch.—An ordinary meeting of the Branch was held on Friday, July 27th, at Newcastle-upon-Tyne. There were present: Drs. Jackson (in the Chair), Taylor, Green, Wilson, Morison, Boustead, Hill, and Scurfield.

MINUTES.—The minutes of the last meeting were read and signed.

DISCUSSIONS.—A discussion took place on Dr. Armstrong's paper and the St. Pancras Meat Case,* and was adjourned till next meeting.

A discussion on the jointing and testing of drains was introduced by Dr. SCURFIELD, and continued by Drs. TAYLOR, BOUSTEAD, and JACKSON, and it was decided to resume this discussion at the next meeting.

ELECTION OF OFFICERS.—On the motion of Dr. WILSON, seconded by Dr. TAYLOR, Dr. Jackson was elected President of the Branch, and Drs. Hill and Scurfield were re-elected Representatives of the Branch on the Council of the Incorporated Society.

Dr. JACKSON, in thanking the members for electing him President, expressed his high appreciation of the great services which the retiring President, Dr. Armstrong, had rendered to the Branch during his long period of Office.

On the motion of Dr. SCURFIELD, seconded by Dr. TAYLOR, a hearty vote of thanks was passed to the retiring President, Dr. Armstrong.

Scottish Branch.—A meeting of this Branch was held at Aberdeen on Tuesday, August 7th. Present: Professor Matthew Hay (President), in the Chair, Drs. McVail, Chalmers, Leslie Mackenzie, and Templeman.

MINUTES.—The minutes of the meeting held at Edinburgh on May 19th were read and approved.

CORRESPONDENCE.—An apology was intimated from Dr. Maxwell Ross.

A letter was submitted from the treasurer of the Royal Medical Benevolent College requesting a subscription to the funds of that institution, but, after consideration, the meeting regretted that the Branch was not in a position to subscribe.

ANNUAL REPORT.—The Treasurer's report was submitted, and showed a balance of £42 7s. 9d. in favour of the Branch.

ELECTION OF OFFICE-BEARERS.—The office-bearers for the past year were re-elected. Dr. J. T. Wilson was appointed a member of the Council of the Branch in room of Dr. Sutherland resigned.

CLASSIFICATION OF DIARRHOEA DEATHS.—The question of the classification of "diarrhoea" deaths was considered, and it was decided to intimate to the Council of the Society that the Branch was prepared to forward to the Medical Officers of Health in Scotland copies of the circular dealing with this matter for distribution amongst the practitioners in their respective districts. It was considered that practitioners generally would be more likely to carry out its recommendations were the matter brought under their notice by the medical officer of health of their district rather than by the Council of the Society.

ROYAL MASONIC INSTITUTION FOR BOYS (ELECTION, OCTOBER, 1900).—The Editor will be glad to receive votes on behalf of William Peehey Smart, aged seven years. He is the eldest of a family of five children. His father, W. P. Smart, L.R.C.P. and M.R.C.S., was in medical practice for some years at Fressingfield, Suffolk, and medical officer of health of Hoxne Union, but from failing health was obliged to relinquish his practice, is now in greatly reduced circumstances, and without the means of providing for the education of his children.

* See PUBLIC HEALTH, xii. 710 (July, 1900).

THE ROYAL INSTITUTE OF PUBLIC HEALTH CONGRESS AT ABERDEEN.

AUGUST 2ND TO 7TH, 1900.

THE Congress of the Royal Institute of Public Health in Aberdeen took place under the presidency of the Earl of Aberdeen. The meetings were held in the Marischal College of the University, the Lord Provost of Aberdeen being the Honorary President of the Congress. There was a very large attendance of Fellows, Members and Delegates, the latter representing municipal corporations, urban and rural sanitary authorities, and learned societies throughout the Kingdom.

The Presidential Address delivered by Lord Aberdeen on August 2nd was devoted to a review of the progress of sanitation, particularly from the point of view of legislation, during the last hundred years. The President insisted with considerable force on the necessity for further legislation upon many of the problems which still confront sanitarians.

Subsequently the Sections assembled, and were opened with addresses from their respective Presidents. The Presidents of the various Sections were:

Preventive Medicine and Vital Statistics, W. J. Simpson, M.D., Professor of Hygiene, King's College, London, who took for his subject, "Administration and Research in Preventive Medicine."

Bacteriology and Comparative Pathology, D. J. Hamilton, M.D., F.R.C.S.E., Professor of Pathology, University of Aberdeen, the subject of whose address was "Developments in Bacteriology."

Chemistry and Meteorology, C. Hunter Stewart, M.B., D.Sc., Professor of Public Health, University of Edinburgh. Subject: "Periodical Recurrences of Epidemic Disease and the Meteorological Conditions to which these have been attributed."

Architecture and Engineering, John Honeyman, R.S.A., F.R.I.B.A., architect, Glasgow. Subject: "Abnormal Mortality in some great Cities."

Municipal and Parliamentary Hygiene, Robert Farquharson, M.D., M.P. Subject: "Hygienic Work of County Councils."

The Sections having been opened, the reading of papers commenced, and the Sections were ultimately adjourned until Friday. In the evening a reception was given by the Lord Provost and Town Council of Aberdeen in the Art Gallery, which was largely attended.

On Friday there was to have been an address on "Disinfection" by Professor A. Sheridan Delépine, but, owing to that gentleman's illness, the address was not delivered. The Sectional meetings occupied the whole of the morning, and in the afternoon the members of the Congress were entertained to luncheon by the Lord Provost and Town Council in the Music Hall, and subsequently a garden-party was given at the residence of the Lord Provost.

Saturday was entirely devoted to excursions to Balmoral, to the Duke of Fife's residence, Duff House, to Finzean, the residence of Dr. Farquharson, M.P., etc.

On Sunday morning a special service in connection with the Congress was held in St. Nicholas West Parish Church, at which a very large

number of delegates attended. The sermon was preached by the Very Rev. J. Marshall Lang, D.D., Principal of the University of Aberdeen.

On Monday there was a very crowded attendance at 10 a.m., when Professor Percy Frankland delivered a most interesting address on "Recent Developments in the Purification of Sewage." The rest of the day was devoted to meetings of Conferences of Medical Officers of Health, Sanitary Inspectors, and Veterinary Surgeons. The Conference of Medical Officers of Health was presided over by Dr. J. C. McVail, Medical Officer of Health for the Counties of Stirling and Dumbarton, and President-elect of the Incorporated Society of Medical Officers of Health. The subjects discussed were "The Working of the English Vaccination Act," "Infantile Mortality Problem and its Solution," and the "Relative Duties of Urban and Rural Sanitary Authorities in the Prevention of Tuberculosis." There was a very large attendance throughout the day. The President of the Conference of Sanitary Inspectors was Mr. Peter Fyfe, F.R.S.E., Chief Sanitary Inspector of Glasgow; and the President of the Conference of Veterinary Surgeons was Principal Williams, F.R.C.V.S., Principal of the New Veterinary College, Edinburgh. In the course of the afternoon a garden-party was given by Sir David and Lady Stewart, at their residence, Bankery House. In the evening the Congress dinner was held in the Music Hall, at which Lord Aberdeen presided.

Tuesday saw the conclusion of the Congress. Meetings of the Sections were held early in the morning. In the Anatomical Department of the Marischal College an address was given by Dr. Patrick Manson on "Malaria—a Sanitary Problem." Microscopical demonstrations illustrative of the address were subsequently given in the Section of Bacteriology and Comparative Pathology, under the presidency of Professor Hamilton. At the concluding meeting of the Congress, at which Lord Aberdeen again presided, a letter was read from Sir Arthur Bigge, acknowledging on behalf of Her Majesty, a resolution passed at the opening meeting of the Congress of sympathy on the death of the Duke of Saxe-Coburg and Gotha.

The resolutions passed in the various Sections were brought up and were referred to the Council for consideration. They were as follows:

SECTION A.—PREVENTIVE MEDICINE AND VITAL STATISTICS.—"That this Section is of opinion that, to effectively deal with the public health interests of a district, it is desirable that facilities should be acquired by sanitary authorities for bacteriological and other cognate work."

SECTION D.—ARCHITECTURE AND ENGINEERING.—"That in the opinion of this Congress, the attention of the various railway companies be called to the necessity of more efficient cleansing and the more sanitary construction of railway carriages, and also conveniences at the smaller railway-stations, having regard to the question of the possibility of infection to passengers."

SECTION E.—MUNICIPAL AND PARLIAMENTARY HYGIENE.—1. "That the Congress of the Royal Institute of Public Health held in Aberdeen in August, 1900, comprising official representatives of the sanitary authorities of the chief cities, municipal boroughs, and other sanitary authorities in the United Kingdom, and also delegates from learned societies and associations interested in sanitation, records its opinion that it is urgently necessary to the protection of the public health that means should be available by which the public authorities and the public generally may be enabled to distinguish plumbers who are properly qualified to perform their work with due regard to its sanitary

efficiency from incompetent persons, and to this end the Congress requests the Royal Institute of Public Health to take all necessary measures to secure prompt legislation, establishing the national registration of plumbers on a statutory basis, ensuring the qualification and responsibility of the persons registered."

2. "That a memorial be addressed to the Right Hon. A. J. Balfour, First Lord of the Treasury, calling his attention to the desirability of the Government dealing with the registration of qualified plumbers in the interests of the public health; and that such memorial be placed in the rooms of the Congress for signature by delegates and members of the Congress."

3. "That the Earl of Aberdeen be requested to introduce a Bill into the House of Lords, providing that women shall be eligible for election as members of all municipal and sanitary boards in Great Britain and Ireland, and amending in this respect the London Government Act of 1899."

4. "That this Congress urges the President of the Local Government Board to introduce legislation forthwith to enable local authorities executing schemes under Part II. of the Housing of the Working Classes Act, 1890, to borrow the necessary money for reconstructing artisans' dwellings for all the persons displaced by such schemes, seeing that the charge of raising such capital money out of current rates is prohibitive, and discourages local authorities from dealing with insanitary areas."

5. "That the Local Government Board be requested to obtain the opinion of the law officers of the Crown whether it is legal for municipal authorities erecting artisans' dwellings under the Housing of the Working Classes Act, 1890, to charge upon the rents the sums necessary for repaying, by instalments, the capital cost of erecting the dwellings."

6. "That the Local Government Board be urged to promote legislation for the amendment of the Public Health and Local Government Conference Act, 1895, so as to enable the reasonable expenses of any officer appointed by a local authority, attending any conferences, to be paid, instead of the power of the authority being restricted, as at present, to the payment of the expenses of members or clerks only."

7. "That this Conference approves of standard of air-space for dwellers in cities and large towns being raised to 500 cubic feet for every adult, and 250 cubic feet for each child under ten years of age."

CONFERENCE OF MEDICAL OFFICERS OF HEALTH.—"That the Government should introduce in an ordinary Public Health Act, or otherwise, as is most convenient, an Act to be generally applicable, embodying all powers for the proper supervision of milk and meat supply."

CONFERENCE OF SANITARY INSPECTORS.—"That the time has now arrived when the Government should be approached to appoint a Department of Public Health, with a Minister at its head with Cabinet rank."

"That in view of the difficulties in the acquisition of slum areas for the purpose of reconstruction and providing houses for humbler classes, this Conference resolves that it is expedient that power be obtained that on the representation of the medical officer of health and sanitary inspector the local authority may approach the Secretary for Scotland, who shall remit to an arbitrator to be named by the Sheriff to hold a local inquiry, and report to the Secretary for Scotland, on whose approval the scheme shall come into force."

CONFERENCE OF VETERINARY SURGEONS.—“That this Conference of Veterinary Surgeons, having fully considered the pathological condition in the sheep's lung commonly known as pseudo tubercle, is of the opinion that such parasitically-infected organs are unfit for human food, and would respectfully draw attention to this condition with the view to their general condemnation.”

BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING AT IPSWICH, JULY 31st TO AUGUST 3rd, 1900.

THE SUPPLY OF STERILIZED HUMAN MILK FOR USE OF INFANTS AT ST. HELENS.—Dr. Harris, Medical Officer of Health of St. Helens, described a system which had been adopted with the object of combating and limiting the excessive mortality of infants under one year of age. He pointed out that there was little doubt that the incidence of diarrhoea and diseases of the digestive system was particularly heavy among bottle-fed children, a fact due either to the foul condition of the bottles or to the sourness of the milk, or to both these causes combined. During the past five years in St. Helens, 81 per cent. of the children under six months who had died from diarrhoea were bottle-fed. Dr. Harris then proceeded to describe the system recently adopted by the municipality of St. Helens. A small six-roomed house was taken in a conveniently central position, and was adapted to their requirements, and in August, 1899, they were able to begin the supply of sterilized humanized milk for infants. The system, he said, was as follows: The milk on its arrival is tested, to ascertain roughly its percentage of cream, between 9 and 10 per cent., by volume, being regarded as the best amount. The milk is then diluted by one-third of its bulk, to reduce the proteids to the proportion usually found in human milk. Cream and sugar are then added to the extent of three and two ounces per gallon of mixture respectively, and a small amount of salt is also put in. By these means a milk approximating in composition to human milk is obtained. The milk is next placed in stoppered bottles, and the stoppers closed, the bottles when filled being placed in the sterilizer. In the sterilizer, as soon as the thermometer indicates 102° C., the time is noted, and that temperature is maintained for three-quarters of an hour.

By this simple means, he added, very perfect sterilization was obtained, and yet the milk in no sense tasted “boiled.” With regard to the results, it was difficult, at this early period, to give any accurate direct statistics. Up to the end of the year 284 children had been supplied with the milk for longer or shorter intervals. Of these, 52 only used the milk for a week or less. Excluding these, the death-rate among the remainder was only 103 per 1,000, compared with 157 per 1,000 births, taking the borough as a whole. During the very hot weather last August and September, when diarrhoea was so prevalent throughout the whole country, many cases were brought to the depot in the last stages of this disease. In more than one instance the sterilised milk seemed to work like magic, and the recoveries were most remarkable.

MODERN SYSTEMS OF SEWAGE TREATMENT.—The question raised by Dr. A. C. Houston, in an exhaustive paper, was “Can modern systems of sewage treatment be depended upon to remove the *Bacillus typhosus* and allied organisms?” Dr. Houston said he proposed to confine his

remarks wholly to bacterial filters, because septic tanks, whatever their advantages might be from the chemical and practical point of view, could not, he thought, be regarded as much better than modified cesspools from the view-point of the epidemiologist. The impossibility of the microbes being retained in biological filters would be readily appreciated, and where the attempt had been made to use finer material, with the object of holding back the bacteria, the filters had usually, if not invariably, become choked up. In fact, it might be stated in general terms, and with comparative safety, that the mechanical separation of the micro-organisms in sewage by the use of bacterial beds was virtually impossible. Experiments proved that some pathogenic microbes passed through filters in practically undiminished numbers, and indicated that until positive evidence to the contrary was forthcoming, it would be wise to regard the effluents from bacterial beds as no more safe in their possible relation to disease than crude sewage. He wished it to be understood, however, that he was chiefly dealing with the Crossness experiments, and it did not follow that these results had a constant value in the case of all bacterial filters. It was only right to add that, from the chemical and practical point of view, the coke-beds at Crossness were highly efficient. Thus, the suspended matters were removed, the reduction in the amount of dissolved oxidizable matter was very striking, and the effluents were apparently non-putrescible. One lesson to be learnt from these experiments was that the element of time or “delay” was an all-important factor, and that it was doubtful if any bacterial process in practical operation at the present time “treats” or “detains” the sewage for a sufficiently long period to allow of the complete destruction of all the pathogenic germs by bacterial agencies.

FOOD PRESERVATIVES AND COLOURING MATTERS IN FOOD.—Dr. A. S. Grunbaum said that the enormous extent to which food preservatives were now being used, the abuses to which they were put, and the injuries which they might cause, made stringent and definite legislation on the subject necessary. At present our law was too vague and narrow, our trade interests too selfish, and our magistrates for the most part too ignorant, for much progress in this direction. That laws requiring any trade to have consideration for the public good should be destructive to such trade he did not believe. Preservatives might be added—(1) in a *bona-fide* way; (2) with fraudulent intent; or (3) with a view to either temporary or permanent preservation. The addition might be considered *bona-fide* if the purchaser was aware of the addition or the article was well known to usually contain a preservative, and its use was fraudulent if the addition were concealed, or was used to make a stale article appear fresh, or if the preservative was injurious. It seemed to him that in a strictly legal sense any addition of preservatives to milk was illegal, because a customer, if offered his choice of fresh milk or of milk apparently fresh, to which the preservative had been added, would undoubtedly choose the former. Continental opinion seemed pretty unanimous regarding the inadvisability of permitting the addition of preservatives to milk. In examining into the question of preservatives, he had, unfortunately, not been able to find evidence of a high standard of commercial morality. To illustrate this remark, Dr. Grunbaum read a couple of extracts from the price-lists of firms engaged in supplying confectioners and brewers. Concerning saccharine, there was the following paragraph: “As a cure for ‘sick’ beers, even when such a dubious lot of beer already begins to show signs of incipient ‘taint,’ there may yet be time to save it by quick action in

introducing, as may be needed, from 1 to 2 oz. of saccharine per 500 gallons, and thereby arresting the souring process, and at once making the beer drinkable and marketable."

Even apart from its preservative qualities, said Dr. Grunbaum, the substitution of saccharine for sugar was undesirable, as it diminished the nutritive value of the food. Another list had amongst its "brewers' materials," in the largest letters, "potassium metasilphite," directing 1 oz. per barrel to be used, with the remark that "it is a perfect antiseptic in crystals," etc. On another page was a list of brilliant aniline colours for boiled sugars, fondants, lozenges, jujubes, etc. He thought the law at present somewhat too lenient, since it permitted imprisonment as punishment only with the second offence and if the prescribed fine amounted to £50. If they could rely on the quantity and quality of a preservative being always intimated to the purchaser, it might be possible to permit their use within certain limits, but he saw no hope of inducing the trade at large to do so. Occasionally and exceptionally one did come across instances where the addition of a preservative was noted on the label; but having regard to the inherent characteristics of commerce, the regulations should be definite and punishment severe. In most articles of food the addition of preservatives should be uncompromisingly forbidden, and the only class in which it seemed to him in any way admissible was preserved meat of various kinds—for example, ham, bacon, etc., but not in potted meat. As regarded preservatives in milk, cream, etc., the matter seemed to him to rest chiefly with the railway companies and with the ice vendors. Ice was used far too little in England, principally on account of its exorbitantly high price, for he imagined people would prefer to have their summer drinks cold. He believed the cowkeeper would use a refrigerator if ice could be obtained at a reasonable price. But the railway companies were the chief offenders. They did not supply refrigerator vans; they required milk-cans to be sent open unless they were full, in spite of the obvious risks of contamination; their rates were too high, and their servants too careless. These seemed almost to take a malicious pleasure in putting milk-cans in the sun. It would appear, therefore, that they might do some injustice by legislating too hardly for the purveyors of our perishable foods, unless at the same time they required rational treatment of the same from their carriers.

At the conclusion of his paper, Dr. Grunbaum proposed, "That in the opinion of the Section of State Medicine of the British Medical Association the addition of preservatives to milk, butter, and similar products, and to beer and wine, should be prohibited, and their addition to other foods regulated by statute."

The resolution was seconded by Dr. Cooper Pattin, and, after discussion, adopted.

ROGERS PRIZE.—At a meeting of the Senate of the University of London held on March 28th, 1900, it was resolved that one sum of £100 be offered as the Rogers Prize, open for competition to all the members of the medical profession in Great Britain and Ireland, for an essay under the following regulation as to the subject and conditions thereof, namely: An essay by any member of the medical profession in Great Britain and Ireland upon the "Production of Immunity in Specific Infective Diseases" generally, and with particular reference to any one disease on which the writer of the essay has made original investigations. The essay is to be sent to the Registrar, University of London, South Kensington, S.W., on or before June 1st, 1901.

REVIEW OF RECENT BACTERIOLOGY.

THE SUSCEPTIBILITY OF COLD-BLOODED ANIMALS TO TUBERCULAR INFECTION.—The question as to the possibility of tubercular infection in cold-blooded animals is an old one, and has engaged the attention of many bacteriologists. Sibley described a case of reptilian tuberculosis, and subsequently inoculated English ring-snakes and common vipers with pure cultures of the bacillus.* The snakes were kept at a temperature of 35° C., and died from fifty to seventy days after inoculation. No appreciable macroscopic lesions were found after death, but microscopic examination showed the presence of tubercle bacilli in the tissues. Despeignes inoculated frogs under the skin and into the anterior chamber of the eye. Some of the reptiles were kept at 25° C., and others at the temperature of the laboratory. Death occurred in from two to eight days. No lesions could be found after death, but an emulsion made from the tissues of the frog caused tuberculosis in guinea-pigs inoculated with it. Similar inoculations in the case of fish gave entirely negative results, not even infection of the inoculated guinea-pigs following.† Lortet and Despeignes carried out similar experiments with earth-worms, and showed that the bacilli could preserve their vitality in the tissues of the worms for several weeks without causing any obvious lesion. Michele, after a number of experiments, came to the conclusion that cold blooded animals were absolutely refractory to this infection. Bataillon, Dubard, and Terre described the case of a carp which presented a tumour in the abdominal wall. The tumour contained a large number of bacilli which stained by Ehrlich's method, and morphologically resembled *Bacillus tuberculosis*. The bacillus, however, when isolated grew at an optimum temperature of 25° C., showing a good growth on agar after three or four days. At the end of nine or ten days it was found that the growth was no longer bacillary in character but resembled that of a mould. These observers believed that they had obtained a saprophytic form of the organism occurring naturally in fish. Auché and Hobbs have re-investigated the question.‡ Frogs were inoculated by the mouth, subcutaneously into the lymph-sac, and into the peritoneum with cultures derived from human and avian sources. Positive results were only obtained after the intra-peritoneal inoculations, when small granulations were found after death on the surface of the liver, in the mesentery, and occasionally in other viscera. Very clear evidence was obtained that the bacilli did not increase in the tissues, and exactly similar results followed when dead instead of living cultures were used. In short, the appearances found were merely such as are known to follow the injection of dead tubercle bacilli in mammals, and showed that the frog is not susceptible to tubercular infection in the ordinary sense of the term.

THE PRESENCE OF B. DIPHTHERIÆ IN THE THROATS OF HEALTHY PERSONS.—Kober§ examined cultures taken from two series of apparently healthy persons. The first series comprised 123 individuals

* *Trans. Path. Soc.*, vol. xliii., 1892.

† See also "Review of Recent Bacteriology," *PUBLIC HEALTH*, xii., 239 (December, 1899).

‡ *Archiv. de Méd. Expér. et d'Anat. Path.*, 1re série, tome xii. No. 4, 1900.

§ *Révue des Maladies de l'Enfance*, Juillet, 1900.

who were known to have recently been in contact with patients suffering from diphtheria; and diphtheria bacilli were found in the throat in the case of ten of these (8 per cent.). The second series comprised 600 individuals who had not recently come into contact with any diphtheria cases; and from five of these a diphtheria-like bacillus was isolated. The bacillus isolated from the first series was of typical virulence for the guinea-pig; the organism isolated from the five cases of the second series was a rather short bacillus with swollen ends which was not pathogenic for the guinea-pig.

BACILLUS AEROGENES CAPSULATUS.—Professor Welch in his Shattuck Lecture* gives a full account of this organism, with which his own name is so closely associated. The natural habitat of the bacillus is the soil and the intestinal canal; thus Howard found it in the intestine in twenty-five consecutive post-mortem examinations, confirming the diagnosis by animal experiment in ten, and it has also been found in the intestines of rabbits, dogs, and swine: it is of frequent occurrence in floor dust. The usual manifestation of the presence of the bacillus in the tissues after death is a development of gas in the blood and organs ("foamy liver," etc.) within one, two, or three hours, and without any other evidence of post-mortem decomposition. This gas-development is most frequently observed in autopsies on pregnant or puerperal women, especially after death from abortion, operations for placenta prævia, and acute sepsis. The bacillus causes emphysematous gangrene of wounds, and Welch regards it as the special organism of "malignant oedema," believing that the so-called *Bacillus ordematis maligni* is not the true cause of this condition, as it occurs in man. The bacillus is anaërobic, and does not usually infect the blood during life, although it has been isolated once by Gwyn from the blood of a living patient in a case of chorea insaniens with acute endocarditis. With regard to the biological characters of the bacillus: spores develop only on certain media, and a capsule cannot always be demonstrated. It stains by Gram's method, but in a culture one or two bacilli may be found which do not take the stain. Gelatine is usually slowly liquefied, and the organism ferments glucose, lactose, and saccharose. If a rabbit is injected intravenously with a culture and killed a few minutes afterwards, there is abundant gas-development in the blood and all the tissues within a few hours. Rabbits and mice are rather less susceptible than guinea-pigs and pigeons.

ENTERIC PLEURITIS.—Souques, Lesné, and Ravant record† two cases of this form of pleurisy. The first case was that of a man æt. 18, who developed symptoms of pleurisy on about the sixteenth day of enteric fever. Some blood-stained fluid was withdrawn from his chest, and a pure culture of the specific bacillus was isolated from it. The other case was that of a man æt. 31, who had developed similar symptoms. Towards the end of the fourth week the *Bacillus typhosus* was obtained in pure culture from a like blood-stained pleural effusion.

PRIMARY PNEUMOCOCCIC PERITONITIS.—Ménétrier, at a meeting of the Société des Hôpitaux,‡ described the case of a man æt. 22, who was taken suddenly ill with pains in the abdomen, and died a week later. At the post-mortem examination peritonitis was found and a pure culture of the pneumococcus isolated from the effusion. No other lesion was found. In another case, a man æt. 35, after a fortnight's illness a

* The Boston Medical and Surgical Journal, July 26th, 1900.

† Bul. de la Soc. Méd. des Hôp. de Paris, 3e série, No. 2, 1900.

‡ La Semaine Médicale, 18 Juillet, 1900.

general peritonitis was found, with numerous infarcts in the spleen and liver, and embolism of the left radial artery and of the right popliteal, posterior tibial and pedal arteries. The emboli contained numerous pneumococci; and from the peritoneum the same organism, together with a white staphylococcus, was obtained.

ANALYTICAL NOTES.

THE INFLUENCE OF CERTAIN ALCOHOLS, ACIDS, AND SUGARS ON THE DIGESTION OF PROTEIDS BY PEPSIN AND TRYPSIN. E. LABORDE.—In his comparative experiments on this subject the author digested a definite quantity of coagulated egg albumin with acid pepsin or alkaline trypsin in the presence of 50 c.c. of a 20 per cent. and 5 per cent. solution of the given alcohol, and also as a check with the enzymes in 50 c.c. of water. The flasks were kept at a temperature of 40° C. for four hours in the pepsin digestions, and for three hours in the trypsin digestions, and at the end of those periods the amount of albumoses and peptones in the filtered liquids was determined by precipitating the former with ammonium sulphate, and estimating the organic nitrogen in the solution before and after removal of the albumoses.

In the experiments with pepsin it was found that isobutyl alcohol, glycerol, and malic acid favoured the digestion when present in small quantity, whilst methyl alcohol appeared to have a very slight accelerating influence. On the other hand, the digestion was markedly retarded by the presence of ethyl and propyl alcohols, by lactic and tartaric acids, and by mannitol and glucose.

In the case of trypsin, the activity of the enzyme was accelerated by methyl and isobutyl alcohols, by glycerol, and by glucose, and retarded by ethyl and propyl alcohols, by lactic, malic, and tartaric acids, and by mannitol.—*Analyst*.

ESTIMATION OF URIC ACID BY PRECIPITATION AS AMMONIUM URATE.—This process depends on Fischer's statement (*Berichte*, 1899, xxxii., 3266) that uric acid can be heated with dilute caustic soda without losing ammonia. 150 c.c. of urine are warmed to 40° C. or 45° C., and 30 grammes of ammonium chloride are dissolved in it. After standing for about an hour, the precipitated ammonium urate is filtered off, and washed with a 10 per cent. solution of ammonium sulphate till it no longer gives a chlorine reaction. The residue is dissolved in hot 1 or 2 per cent. caustic soda, and the paper is washed with hot water. The filtrate is then heated on the water-bath until all free ammonia has disappeared, and finally kjeldahled with 15 c.c. of strong sulphuric acid and a little copper sulphate. 1 c.c. of decinormal sulphuric acid corresponds to 0.0042 gramme of uric acid.

It seems improbable that other substances should be thrown down from the urine by this treatment. Small amounts of albumin are without effect; larger quantities are objectionable. Urines containing urate or phosphate deposits can be used directly.—*Analyst*.

A NEW REAGENT FOR THE DETECTION AND ESTIMATION OF NITROUS ACID.—In the author's opinion, the methods used for the detection of nitrites in water leave much to be desired. He states that in his experience well and surface water, in which the nitrites correspond in

quantity to a $\frac{1}{100,000}$ N solution, contain large numbers of bacteria. In exceptional cases the bacterial production of nitrites in natural water may reach a concentration corresponding to a $\frac{1}{10,000}$ N solution. When the amount of nitrite nitrogen does not amount to 1 centigramme in a cubic metre of water, he considers that it may be ignored; but that when it amounts to from 1 centigramme to 1 gramme per cubic metre, an at least approximate estimation is necessary, in order to form a correct judgment of the character of the water.

If the nitrous acid in the water can be quantitatively converted into azo compound, it should be possible to make a colorimetric estimation. Metaphenylenediamine and similar substances, however, cannot be used for this purpose, since the brown colorations obtained are not sufficiently characteristic, and, on the other hand, they also give somewhat similar colorations with oxidizing agents.

After numerous experiments, the author has finally fixed upon 1-8 amidonaphthol 4-6 disulphonic acid as the most suitable substance. This is prepared from 1-3-5 naphthalene-sulphonic acid (*Berichte*, xxii. 3186) by nitration, reduction, and heating with sodium hydroxide. It has the property of combining in acid solution with diazo compounds to form mono-azo colouring matters, which are readily soluble and have a characteristic tint.

In using the reagent, 50 c.c. of the water are treated with 5 c.c. of a hydrochloric acid solution of sulphanilic acid (2 grammes of sodium sulphanilate per litre), and after ten minutes about 0.5 gramme of 1-amido-8-naphthol-4-6-disulphonic acid in the solid state is introduced. In the presence of nitrous acid a brilliant Bordeaux-red colour is produced, and reaches its maximum intensity in about an hour.

For quantitative estimation, the colour is compared after that lapse of time with that given by standard solutions under the same conditions. The solutions used are $\frac{1}{100,000}$ N, $\frac{1}{10,000}$ N, and $\frac{1}{1,000}$ N, and should be freshly prepared in order to avoid bacterial alteration.

As a proof of the superiority of this test over bacteriological methods, the author cites a case in which a well-water, which had given rise to an epidemic of anthrax, gave a pronounced nitrite reaction after a year, although the bacteria had long disappeared. He points out that it is seldom possible to actually isolate anaerobic pathogenic bacteria, on account of their short life.

As regards other tests for nitrites, that of Griss with α -naphthylamine (*Berichte*, xii. 427) is said not to be sufficiently sharp or characteristic for water analysis, and to be unsuitable for a colorimetric estimation.

Still less satisfactory is Riegler's reagent, naphthionic acid (*Analyst*, xxii. 305), since, as is the case with many other readily-diazotized bodies, its fluorescence interferes with the comparison. The author's reagent is stated not to fluoresce under the conditions given above. With oxidizing reagents, such as ferric chloride, it gives a yellow coloration which cannot possibly be confused with the red colour obtained with nitrites.

The author has made arrangements with J. F. Schwarzlose Sohn (Berlin S.W., Markgrafenstr. 29) to forward specimens of his new reagent gratis on application.—*Analyst*.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

BEFORE MR. VEREY, OFFICIAL REFEREE.

June 15th, 1900.

HARMAN T. SIMPSON.

This case raised important points regarding the standard of sanitary condition covered by the implied warranty given by the landlords when letting furnished houses. The defendant agreed to take a furnished house -33, Pandora Road, Hampstead—from the plaintiff for twelve months, but on being advised by his sanitary surveyor that the house was unsafe as a place of residence, he declined to take the house.

The sanitary inspector of the Hampstead Vestry, called for the plaintiff, expressed the opinion that the sanitary arrangements of the house were satisfactory, and equal to ninety-nine out of every hundred houses in Hampstead.

The following facts were admitted by witnesses on both sides: That the w.c. on the bedroom floor was not against an external wall; that the earthenware trap of this closet was connected to the soil-pipe by means of a "putty joint"; that the soil-pipe was of light iron rain-water piping, rusty, jointed with putty, and in the centre of the house throughout its whole course; that there was no disconnecting trap between the sewer and the house; and that the only means of ventilation to the drain was the iron soil-pipe already mentioned.

In cross-examination, the inspector admitted that in consequence of a complaint made in the previous January he tested the soil-pipe, and found a defect, which he saw made good; and that in February a further complaint was made, when, on again testing the soil-pipe, he found two new defects. These were also remedied. In May Mr. Simpson agreed to take the house furnished, but before entering into occupation had a sanitary survey made, the result being that the house was condemned.

On behalf of the defence, it was said that a w.c. and soil-pipe as described were dangerous to health, and it was urged that the evidence of the Vestry inspector proved that a thin iron soil-pipe with putty joints could not be relied upon even from month to month, defects not existing in January having been discovered in February.

Judgment was given for plaintiff with £70 damages.

BEFORE MR. JUSTICE MATHEW, SITTING WITH AN ASSESSOR
(MR. BALDWIN LATHAM, C.E.).

July 13th, 14th, 16th, and 24th.

THE ATTORNEY GENERAL ON THE RELATION OF THE SEVENOAKS RURAL DISTRICT COUNCIL AND THE SEVENOAKS RURAL DISTRICT COUNCIL
v. WHITMORE.

This action was tried at Maidstone on July 13th, 14th, and 16th. The relators and plaintiffs are the local sanitary authority for the parish of Edenbridge, and the defendants, Messrs. T. and H. Whitmore,

are the owners of a tannery in that parish. The plaintiffs claimed an injunction to restrain the defendants from causing or permitting the effluents from their tannery to flow into the sewers of the plaintiffs, on the ground that such effluents were of so offensive and dangerous a character that they caused the effluent flowing from the plaintiffs' sewage farm into the river Eden to be a nuisance to, and injurious to the health of, the inhabitants of the parish of Edenbridge and the persons living near the river Eden.

The defendants contended that the plaintiffs were bound to continue the admission into their sewers of the effluents from the tannery, and that the nuisance, if any, was caused by the inefficient state and unskilful management of the sewage farm; and they alleged that the tannery effluents were as capable of being dealt with by bacterial treatment as ordinary sewage, if the sewage farm were properly managed.

The plaintiffs further contended that the tannery effluents contained free alkalinity to an extent which rendered them a liquid which would "prejudicially affect the application to land" of the sewage matter conveyed along their sewers, within the meaning of Section 7 of the Rivers Pollution Act, 1875 (39 and 40 Vict., c. 75), and that consequently they were not compelled to receive such effluents into their sewers.

It appeared that in 1875, when the local authority constructed a system of sewers leading to settling tanks and thence into the river Eden, the defendants had received a notice requiring them to connect their tannery with the sewers of the local authority, which they had done. In 1886 the present system of sewerage was constructed, and before connecting themselves with the new system the defendants, at the request and under the supervision of the sanitary authority, erected settling tanks upon their own premises. Upon the completion of this work, the sanitary authority agreed to admit, and admitted, the tannery effluents into their sewers.

Dr. Voelcker and Dr. Thudicum were called on behalf of the plaintiffs, and stated that in their opinion the tannery effluent contained alkalinity to so great a degree that a liquid resulted which prejudicially affected the application to land of the sewage matter conveyed by the plaintiffs' sewers.

Mr. Strachan, Mr. Frank Scudder, and Mr. Santo Crimp, who were witnesses for the defendants, were of opinion that the effluent of the tannery, in which no chemicals other than vegetable acids and lime were used, in no way prejudicially affected the application of the sewage to land, inasmuch as a considerable quantity of the free alkalinity was reduced by carbonic acid from household sewage in the plaintiffs' sewers and the settling tanks at the sewage farm. They also considered that, owing to the sewage farm being on a clay soil and under-drained, the sewage matter found its way through the cracks in the soil into the under-drains, unaffected by the bacteria on the surface, and so passed in its crude state into the river.

The Assessor (Mr. Baldwin Latham), having made a report to the learned Judge,

His LORDSHIP, in delivering a considered judgment on July 24th, stated that he was not convinced by the evidence given on behalf of the plaintiffs, and that he relied and acted upon the evidence of the witnesses for the defendants. He gave judgment for the defendants with costs.

Mr. Witt, Q.C., and Mr. Morton W. Smith appeared for the plaintiffs; and Mr. Dickens, Q.C., Mr. G. F. Hohler, and Mr. C. M. Pitman for the defendants.

DAMAGES OBTAINED FOR OVERFLOWING CESSPIT.—In the case of *Stephens v. Plympton Rural District Council*, heard recently at Plymouth County Court, Thomas Stevens, butcher and dairyman, Plymouth, claimed £20 from the Plympton Rural District Council for damage to a field at Egg Buckland by defective drainage. Mr. J. P. Dobell appeared for the plaintiff; Mr. Percy Pearce for the District Council.

Mr. Dobell said for seven years plaintiff had rented a field called Buckland Hayes, Egg Buckland. Three years ago the Council, without any notice to plaintiff, and without his consent, laid a drain through the field to a cesspit at the top. The result was that the cesspit constantly overflowed, the grass became very coarse, and plaintiff suffered considerable loss. In October, 1898, Mr. Stevens made a claim against the Council for £8 for damage caused, and after a great deal of demur the amount was paid. From October, 1898, the cesspit had been constantly overflowing, and no compensation had been paid plaintiff. Bullocks and sheep would not eat the grass. It was a serious matter for plaintiff, a dairyman, as he had been unable to keep his cows in the field.

The plaintiff stated that when the sewage began to overflow, the whole of the ducks in the parish found out the field. Cattle broke away from the field because the grass was so coarse, and he had been compelled to pay compensation for his cattle going on other people's property. His sheep had to be shorn early in May instead of Midsummer, because they had worm and fly in consequence of eating the grass polluted with sewage.

Alfred Michelmores, surveyor, Totnes, for the defence, stated that during the winter the effluent could be used with advantage over three acres of the field. He estimated the damage caused to a small portion of the field by rank vegetation at £2 3s. 9d. He saw no reason why cows should not be kept in the field. There was a splendid stream of water at the bottom of the field. The damage alleged to be caused to the sheep must be imaginary. If proper attention were given to the field the small portion of effluent that overflowed should benefit it.

William Edward Horton, sanitary inspector, said the tank was emptied seven times a year. He could not see how a cart could damage the land. The land was benefited by the effluent.

Benjamin Butland, farmer, Egg Buckland, said the sewage ought to benefit the land if properly irrigated. He wished he had the sewage tank on his farm. It was ridiculous to say that the sewage caused the fly in sheep.

William Merry, Woodford Farm, Plympton, and also a councillor, said he had a cesspit on his farm, and he considered it valuable for irrigating the land. He had visited the field, and could not see that any damage had been done.

Dr. Noy Scott, medical officer of health for the district, said the land had become more valuable by the effluent.

The Judge believed the plaintiff had suffered damage, and he gave judgment for twelve guineas and costs. This sum includes three guineas paid into Court by the Council.

REVIEW.

ON THE RÔLE OF INSECTS, ARACHNIDS AND MYRIAPODS AS CARRIERS IN THE SPREAD OF BACTERIAL AND PARASITIC DISEASES OF MAN AND ANIMALS: A CRITICAL AND HISTORICAL STUDY. By George H. F. Nuttall, M.D., Ph.D. The Johns Hopkins Hospital Reports, Vol. viii., Nos. 1 and 2.

In the opening page of this work the author clearly states that his object is to present to the reader what is known on this subject, with a view to stimulate similar research. The book is mainly a statement of what has been done by others. Each reference is given, and the work of extracting has been most excellently accomplished.

Every disease thought to be spread by insects is dealt with separately. In this way anthrax, plague, hog-erysipelas, chicken-cholera, yellow-fever, cholera, typhoid-fever, tuberculosis, leprosy, various tæniæ and filariæ, and malaria are each commented on.

In the case of anthrax, for instance, no less than sixty separate papers are referred to containing the result of much experimental work. In summarizing these the author remarks that, having read the extensive literature on the subject, he has been struck by the very few cases recorded where the bite of an infected insect set up the disease. The more important experimental work is detailed at considerable length. Among the earlier of such experiments were those of Davaine, in 1870, who fed flies on anthrax blood, and then inoculated the proboscis, legs, and wings into guinea-pigs, with uniformly positive results. If the flies were kept for forty hours before using them for inoculation, only one out of four guinea-pigs died.

The great weight of experimental evidence goes to prove that suctorial insects do not spread the infection in the act of biting, except when the insect is killed while its proboscis is in its host's tissue.

One of the most interesting chapters in the book is that dealing with the mosquito-malarial theory. It is indeed one of the best résumés of this subject that has yet appeared. Particularly is it valuable as a history of this theory.

After mentioning Notts' paper published at New Orleans in 1848 on the mosquito theory, the author draws attention to the elaborately-stated argument of King published in 1883, and then remarks that "it is curious to look over the more recent literature on the subject to see how writers have rediscovered the mosquito-malarial theory. In France the theory is ascribed to Laveran, in Germany to Koch and Pfeiffer, in England to Manson, whilst in Italy the names of Bignami, Mendini, and lastly of Grassi are identified with it."

There appears to be little doubt but that the credit of first putting forward the mosquito-malarial theory belongs to our cousins in the United States. It is equally certain that the credit of working out the theory belongs to Manson and Ross in this country. It is interesting to note that in none of Koch's papers published in 1898 (some of them towards the latter end of the year) is any mention made of the work of Ross or Manson.

Painstaking and accurate résumés on such subjects are most helpful. The author has done his work in a manner which deserves the highest praise. The book will prove most useful to all those who have to deal with the means of spread of the infective diseases.

CORRESPONDENCE.

HEALTH RESORTS: PUBLICATION OF RETURNS OF SICKNESS, ETC.

TO THE EDITOR OF "PUBLIC HEALTH."

SIR,

A question has arisen as regards the expediency of publishing statistics of infectious disease in the local press. Our practice has been to publish full details weekly. I enclose a specimen. We have had no small-pox, but if it comes, our feeling is that we should not treat it exceptionally. But we are met with the argument that such publication would cause alarm, especially in the case of small-pox, and would deter visitors from coming to this health resort; that it is unusual in other watering-places, etc.

We wish to know the practice in other places, especially in health resorts, and especially also as regards the use of the local press in the publication of weekly statistics; and, lastly, whether, to prevent alarm or panic, or injury to trade interests, it is a fair and expedient action to hide the facts from the public.

I am, etc.,
E. C. O.

August, 1900.

INFECTIOUS DISEASES (WEEK ENDING JULY 14TH, 1900).

Cases notified—	Scarlatina. Diphtheria. Enteric Fever.			
	St. P.	St. A.	St. C.	St. D.
St. P. ...	0	1	0	0
St. A. ...	0	1	0	0
Deaths ...	0	0	0	0
Cases under isolation (July 14th)—				
(a) In town hospital ...	0	1	0	0
(b) In country hospital ...	7	0	0	0
(c) At home ...	3	1	0	0
Total ...	10	2	0	0
Increase ...	0	1	0	0
Decrease ...	1	0	0	0

NEW SANITARY REGULATIONS, BOSTON, U.S.A.—1. Pulmonary and laryngeal tuberculosis are included in the list of diseases of which compulsory notification is required, and after a death the Board of Health will disinfect the premises. 2. Two consecutive negative cultures, both from throat and nose, are now required for the release of diphtheria cases from isolation. 3. The laboratory of the Board of Health provides free examinations for physicians in tuberculosis, diphtheria, typhoid fever, malaria, and influenza, and for veterinarians in glanders and rabies. Drug stores in many parts of the city furnish outfits for tuberculosis, diphtheria, typhoid fever, and glanders.—*Philadelphia Medical Journal*.

APPOINTMENTS.

- Brown, G. H., M.B.**, appointed M.O.H. of Lawless Local Board of Health, Western Australia.
- Deane, G. W., M.B.**, appointed M.O.H. of Shire Walhalla, Victoria.
- Elliott, I. L., L.S.A.**, appointed M.O.H. of Cudworth Urban Sanitary District.
- Ellis, H. A., M.B.**, appointed M.O.H. of Bonnieville Local Board of Health, Western Australia.
- Evered, A. C., L.R.C.P.**, appointed M.O.H. of Albany Board of Health, Western Australia.
- Fleming, H. H., M.D.**, appointed M.O.H. of Shire Kara Kara, Victoria.
- Gillies, I., M.B.**, appointed Health Officer (*pro tem.*) of Ingham, Queensland.
- Harken, C. D., M.B.**, appointed M.O.H. of Shire of Chiltern, Victoria.
- King, A., M.B.**, appointed M.O.H. of Watford Urban Sanitary District.
- Mackenzie, D. S., M.D.**, appointed M.O.H. of Glossop Urban Sanitary District.
- McNish, J., M.B.**, appointed M.O.H. of Burketown, Queensland.
- Neech, J. T., L.R.C.P.**, appointed M.O.H. of Halifax Urban Sanitary District.
- Ramsden, H., M.D.**, appointed M.O.H. of Saddleworth Urban Sanitary District.
- Robinson, W. H., L.R.C.P.**, appointed M.O.H. of Preesall with Hackinsall Urban Sanitary District.
- Sharman, E. W., L.R.C.P.**, appointed M.O.H. of Port of Auckland.
- Simons, C. N., L.R.C.S.**, appointed M.O.H. of Shire of Kerang, Victoria.
- Skipworth, A., L.R.C.P.**, reappointed M.O.H. of Quorn Urban Sanitary District.
- Turner, A. J., M.D.**, appointed M.O.H. Central Board of Health, Brisbane.
- Webb, A. B., M.B.**, appointed M.O.H. Shire of Colac (North Division) Victoria.

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 Public Health Act, 1875, Sec. 21.
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 The expression "Dwelling-house" applies to an uninhabited as well as to an inhabited house.
 Housing of Working-Class Act, 1890, Secs. 29 and 33
 Harman v. Simpson, 887
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 Kimber v. Admans, 483
 A covenant with respect to a plot of land included in a

- Law Reports, Kimber v. Admans (continued)**—
 building site, that not more than one house should be built on such plot, does not debar the owner of such plot from erecting a block of flats thereon.
 Logsdon v. Trotter, 481
 A house maintained on the principles of a common lodging-house must be registered and conducted as required by the law regulating such places, although each lodger occupies a separate sleeping-place (cubicle) (*see also* Logsdon v. Booth).
 Common Lodging-Houses Act, 1881, Sec. 7
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 Application for a mandamus (granted) requiring a magistrate who refused to condemn certain foodstuffs (strawberries) on the ground that there was no evidence before him that the strawberries were intended for the food of man, to state a case for the consideration of the Court (*see also* Thomas v. Van Os).
 Public Health (London) Act, 1891, Sec. 47
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 When an amending Act prescribes a new procedure in prosecutions for offences under the original Act, all proceedings initiated subsequent to the date on which such amending Act comes into operation must be in the form prescribed by the amending Act, unless special provisions to the contrary have been enacted by the amending Act.
 Sale of Food and Drugs Act, 1899, Sec. 19
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 Bennett v. Harding, 827
 Stables and stable yards are workplaces, and sufficient and suitable accommodation in the way of sanitary conveniences must be provided for the persons employed therein or in attendance thereat.
 Public Health (London) Act, 1891, Sec. 38
 Logsdon v. Booth, 473
 A house maintained as a common lodging-house on charitable grounds, and not for profit, must be registered as such, and be conducted as required by the law regulating such places. The keeper of a common lodging-house may refuse to admit any person he chooses to exclude (*see also* Logsdon v. Trotter).
 Common Lodging-Houses Act, 1851, Sec. 7, and Common Lodging Houses Act, 1853, Sec. 3
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 The purchase of six small bottles of a drug for the purpose of analysis, and the making up of the unopened bottles into three parcels of two bottles each, is not a division of a sample within the meaning of the Act.
 Sale of Food and Drugs Act, 1875, Sec. 14
 Nicholl v. Epping Urban District Council, 129
 A local authority may require an insufficient privy to be converted to a water-closet (*see also* Robinson v. Mayor, etc., of Sunderland).
 Public Health Act, 1875, Sec. 36
 Regina v. Horrocks and another, Justices, *ex parte* Boustead, 762
 An order made by a Court of summary jurisdiction to abate a nuisance must state the works to be done to abate said nuisance; an order prohibiting the recurrence of a nuisance need not so specify the works.
 Public Health Act, 1875, Secs. 96 and 105
 Robinson v. Mayor, etc., of Sunderland, 123
 When a local authority has decided that water-closet accommodation is required at any house, and has

Law Reports, Robinson v. Mayne, etc., of Sunderland (continued).

set out notice for same, the magistrate, when hearing application by the authority for an order to enter and execute works in default of owner doing same, cannot review such decision of local authority or receive evidence from owner against such decision. (Only appeal against order of local authority is to the Local Government Board (see also Nicholl v. Epping U.D.C.).

Public Health Act, 1875, Secs. 36, 288, and 305
Sevenoaks Rural District Council v. Whitmore, 887

Application for an injunction (refused) to restrain defendants from discharging effluent from tannery into sewers on ground that said effluent interfered with disposal of sewage at sewage farm and caused pollution of river receiving sewage effluent (see also Eastwood Brothers v. Honley U.D.C.).

Rivers Pollution Prevention Act, 1875, Sec. 7

Sykes and another v. Sowerby Urban District Council, 553, 561

A sewer constructed by a landowner to prevent surface water from gaining access to a quarry on his land is a sewer made for profit, and does not vest in the local authority.

Public Health Act, 1875, Sec. 13

Thomas v. Van Os, 698

The jurisdiction of a magistrate, when food which is alleged to be unsound is submitted to him, is limited to the decision whether such food is sound, or unwholesome, or unfit for the food of man; whether such food was intended for the food of man is a matter for argument at a later stage (see also The Queen v. Mead).

Public Health (London) Act, 1892, Sec. 47

Thompson v. Vestry of Camberwell, 828

A verbal complaint having been made to the sanitary

Law Reports, Thompson v. Vestry of Camberwell (continued).

inspector that sewage was escaping into the cellar of premises occupied by the defendant, and the sewer into which such house drained being, after much delay, examined and found defective and choked, it was held that the defendant Vestry was responsible for the neglect of the officers to take proper steps to ascertain and remedy the cause of the nuisance complained of.

Tyler v. Kingham and Son, Limited, 699

Where a summons against a vendor of an adulterated sample of food has been dismissed in consequence of a satisfactory proof that a warranty has been given by a wholesale firm, and a summons is taken against the latter, the analyst's certificate of analysis in respect of the said sample is not admissible as evidence against the giver of the warranty.

Sale of Food and Drugs Act, 1875, Secs. 12-29
Margarine Act, 1887, Sec. 12

Walshaw v. Mayor, etc., of Brighton, 47

Where foodstuff has been condemned by a magistrate, and owner subsequently claims compensation, arbitrator can consider the question of soundness of foodstuff when condemned and award costs of case before magistrate as part of the compensation to be paid.

Public Health Act, 1875, Secs. 116, 117, and 305

Welsh v. Mayor, etc., of West Ham, 371

A builder after delivering possession of completed premises to the owner thereof, cannot be convicted for a continuing offence after so delivering when such building is not constructed in compliance with the bye-laws in force in the district.

Public Health Act, 1875, Sec. 154

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rule, we isolated our cases from three to four weeks in the hospital, but I have frequently thought that a longer period of isolation would have been better. Of course, during the epidemic we are largely the creatures of circumstances, and our actions rather than our judgment are influenced by the number of beds at our disposal compared with the number of cases awaiting admission.

TRANSMISSION OF THE AGGLUTINATING SUBSTANCE OF THE EBERTH BACILLUS THROUGH THE MILK.—Courmont and Cade (*Lyon Medical*, September 3, 1899, p. 5) report the case of a mother who had nursed her two-months' old baby for two weeks after she was taken ill of typhoid fever. Three days after the child was taken from the breast it was found that its blood possessed the agglutinating power in a dilution of 1 to 10, while the mother's milk showed a positive reaction at 1 to 80, and her blood at 1 to 200. Eight days after weaning the infant's blood failed to produce the reaction. The case therefore serves to confirm the observations of Landouzy and Griffon, and of Castaigne, and to demonstrate the possibility of transmitting to a nursling certain properties acquired by the blood-serum of the nurse, and the passage of these substances through the mucous membranes of the infant. The occurrence of the changes in the fluids of the nursling appears to depend upon two factors—the intensity of the changes in the nurse's blood-serum, and the duration of the transmission by ingestion of her milk. This influence is but temporary, and ceases within several days after nursing is suspended.—*American Journal of Medical Science*.

COMPULSORY NOTIFICATION OF PHTHISIS.—The compulsory reporting of tuberculosis is discussed by Dr. S. A. Knopf in the *New York Medical Journal*, September 23, 1899, p. 443. Formerly in favour of compulsory notification, Dr. Knopf has, with larger experience, come to the conclusion that this is not desirable, since the danger to the community is not so much from the consumptive confined to his home under medical care, but from the relatively well tubercular individual who, though expectorating daily millions of bacilli, is able to attend to his occupation. One of the vital duties of health authorities should be, in the writer's opinion, to inspect regularly all institutions which admit cases of pulmonary tuberculosis for treatment and care, and to insist, upon a systematic carrying out of all the necessary precautions concerning prophylaxis. In such institutions, when there is no resident physician, there is much danger to the community from the want of necessary care. Patients under the care of medical men may best be left in the hands of their professional advisers, who will inform them of the requirements for preventing danger to others. Should there be a refractory patient who absolutely refuses to comply with the instructions concerning the expectoration, every conscientious physician would consider it his duty to report such a case as dangerous, and to demand isolation. [The conclusions arrived at by Dr. Knopf are in agreement with those of the advocates in this country of voluntary notification of tuberculosis.]—*Treatment*.

DIPHTHERIA IN RURAL DISTRICTS.*

SINCE 1890 diphtheria has been prevalent in the Eton Rural District, but Dr. Johnstone's report does not show whether it has been confined to one or two parishes, or has been making its way from one to the other. This latter course is, however, the probable one, and the reports of the medical officers of adjoining districts support this view. In 1898, 127 cases were notified. The disease was most prevalent in three parishes of the Eton district (Langley 50 cases, Stoke Poges 33, and Denham 18). The last-named parish is situated some distance from the other two, and does not appear to have derived its infection from them. In Langley and Stoke Poges the element of personal infection was strongly in evidence. None of the cases were sent to hospital, and there was scarcely any attempt at isolation. The schools played some part in disseminating infection, and in several instances there was very heavy incidence of the disease among children who lived in houses which had in common a yard or garden used as a playground. Sore throat had been prevalent in several of the invaded localities, and appeared to be of frequent occurrence in certain terraces and groups of houses, which is not to be wondered at seeing that they were associated with damp sites, overflowing cesspools, accumulations of refuse and excrement, etc. Dr. Johnstone remarks that when diphtheria is introduced into a locality, it appears to show a preference for dwellings in which such sanitary defects are conspicuous.

The parish of Denham adjoins the urban district of Uxbridge, and the first and three subsequent cases were children attending a school in Uxbridge where diphtheria was already prevalent among the scholars. There had been 40 cases in that town in the first five months of 1898.

On the Middlesex side of Uxbridge the Southall-Norwood district is situated, and Dr. Windle has produced a very able report dealing with the prevalence of diphtheria therein. The outbreak commenced in June, 1897, at Hayes Bridge, but there had been a few isolated cases in the district previously. The disease then spread to other parts through the medium of the schools into which the infection was from time to time introduced, chiefly by mild cases, and in Dr. Windle's opinion by the return from hospital of patients not free from infection. In all 80 cases were notified in the second

* "On Recent Prevalence of Diphtheria in the Eton Rural District: Two Reports to the Local Government Board," by Dr. R. W. Johnstone. July, 1899.
"Report upon the Recent Prevalence of Diphtheria in Southall," by J. D. Windle, M.B., B. Ch., Medical Officer of Health, Southall-Norwood U. D. C.

Resolved unanimously, on the motion of Dr. SEATON, seconded by Dr. T. RIDLEY BAILEY, that the report be received and adopted.

ELECTIONS.—The following candidates having been duly nominated, a ballot was taken, and they were declared by the President to be unanimously elected, viz.:

AS FELLOWS.

Dickson, George Cecil, M.D. (Edin.), Dalhousie Villa, Carnoustie, Forfarshire, N.B., M.O.H. Carnoustie.

Oliver, Charles Pye, M.D., D.P.H., Westdene, Maidstone, M.O.H. Maidstone C.B.

Taylor, Shephard Thomas, M.B., 324, Hoe Street, Walthamstow, M.O.H. Chingford U.D.C.

AS AN ASSOCIATE.

Stoddart, John, R.N., M.B., H.M.S. Vernon, Portsmouth.

NOMINATIONS.—A number of candidates were nominated for election at the next meeting.

DEATH OF SIR RICHARD THORNE THORNE, K.C.B.—The PRESIDENT: Before proceeding with the ordinary business of the evening, I wish to take this opportunity to propose a vote of condolence with the family of the late Sir Richard Thorne, at the news of whose death we must all have been greatly shocked. I have already had an opportunity of making my small tribute to his personal qualities in the pages of PUBLIC HEALTH. His personality attracted the confidence and esteem of all members of the public health medical service, and he was a trusted adviser to us in connection with our official work. We shall all join in a heartfelt expression of sympathy with the members of his family and with his official colleagues. I propose the following resolution:

"That the Incorporated Society of Medical Officers of Health desires to express its deep sense of the loss which the public health medical service has sustained by the death of Sir Richard Thorne Thorne, K.C.B., and its sincere sympathy with the members of his family in their bereavement, and with his official colleagues at the Local Government Board."

Dr. SEATON, in seconding the motion, said: We all sympathize very deeply with both the medical department of the Local Government Board and the family of the late Sir Richard Thorne. It is nearly thirty years ago since I first made his acquaintance, and I have been a colleague of his on examination boards for many years, and have been very closely associated with him. We feel we have lost one of the most able men, not only in our own department, but in the medical profession generally. I have been a great admirer of his great perseverance, and of the way in which he worked for any specific purpose. His loss will be very widely felt. I beg to second the President's resolution.

The motion was adopted *sub silentio*.

DEATHS OF DR. THURSFIELD AND DR. LEONARD WILDE.—The PRESIDENT: There is another similar resolution which I deeply regret to have to propose. During the past month we have lost by death two able and very highly respected Fellows of our Society, both of whom have done extremely good service in public health medical work.

Dr. William Neale Thursfield, of Shrewsbury, was a pioneer in the

service, and has done some of the best work in our branch of the medical profession. I well remember a paper read by him before this Society many years ago on the subject of goitre, which contained many original observations, and represented a very large amount of work. It is a somewhat strange coincidence that we should be called upon to express our regret at the loss of Sir R. Thorne and Dr. Thursfield on the same evening, because both were well known for their investigations on the subject of epidemic diphtheria. It was Dr. Thursfield who first showed the close association between damp houses and the occurrence of cases of diphtheria. Dr. Thursfield was until recently medical officer of health of probably the largest district in the country, and at the time of his death Medical Officer of Health of the County of Shropshire. He was retiring in disposition, but highly appreciated by his professional brethren, and to his intimate friends his death leaves a gap which cannot be filled. You will all join in an expression of our deep regret at his death.

Dr. Leonard Wilde was a much younger man, but had already done excellent work in the public health service, and proved himself one of the ablest in the younger generation of hygienists. He was a pluralist in appointments, but, so far as two out of his three appointments are concerned, I can speak from personal knowledge of the excellent work which he accomplished. His reports for the Sussex County Council were admirable in their arrangement and in their matter. I move that expressions of our regret at the loss of these Fellows be recorded, and that the expression of our sympathy be forwarded to their friends.

The motion was carried *sub silentio*.

Mr. WALTER C. C. PAKES then read a paper on "Bacteriology in relation to Public Health,"* which gave rise to an interesting discussion.

North-Western Branch.—The ordinary monthly meeting of this Branch was held at the rooms of the Chemical Club, Manchester, on Friday, December 8th, 1899.

The following Members and visitors were present: Drs. Hayward (President), Berry, Boyce, Garstang, Harris, Hitchon, Hutton, Niven, Pilkington, Porter, Renshaw, Sergeant, Tattersall, Watkins, Wheatley, and Wilding.

The minutes of the last meeting were read and confirmed.

PROFESSOR BOYCE (University College, Liverpool) then read a paper on "Tubercular Sanatoria." The paper was illustrated by numerous lantern slides. A discussion followed, in which Drs. Hutton, Pilkington, and Niven took part.

The Annual Dinner of the Branch was held after the meeting.

The ordinary monthly meeting of this Branch was held at the rooms of the Chemical Club, Manchester, on Friday, January 12th, 1900.

The following Members were present: Drs. Hayward (President), Anderson, Berry, Garstang, Harris, Sergeant, Stephenson, Vacher, Wheatley, and Wilkinson.

The minutes of the last meeting were read and confirmed.

Resolutions of sympathy were passed with Lady Thorne Thorne, and with Mrs. Jenkins, widow of the late Dr. Jenkins, who was Medical Officer of Health for Lytham.

* Publication unavoidably postponed until next issue.

that prepared with meat extract. Secondly, I have found as a matter of experiment that Witte's peptone gives the most constant results. Thirdly, I have tried varying degrees of alkalinity, and have adopted the above as giving generally the greatest number of colonies. As I have always used litmus as the indicator, I am unable to say how much soda should be added after neutralizing with phenolphthalein or rosolic acid, nor can I compare the alkalinity of my gelatin with that of bacteriologists who do not mention their indicator. Fourthly, the meat infusion is not necessarily made on the same day as the gelatin; sterilizing does not harm it, but when once the peptone has been added, the less it is heated the better. For this reason the gelatin is never allowed to set after it has once been dissolved until it has been once sterilized in the test-tubes.

The Inoculation and Plating.—In order to melt the gelatin, the tubes are placed in water at a temperature of 40° C. for about ten minutes.

Sterile Petri dishes are placed on a levelling apparatus filled with ice and water about ten minutes before they are required, in order that the bottom plate may be quite cold. The bottles are now removed from the ice-box, the stoppers flamed and removed, and the requisite quantity of water withdrawn by means of a sterile pipette (1 c.c. of pipette graduated in tenths), care being taken that only the minimum of water remains on the outside of the pipette. A gelatin tube is then taken up, the cotton-wool is flamed, blown out, and removed, the lip of the test-tube is quickly flamed, and the point of the pipette is introduced into the test-tube until it is just above the surface of the gelatin, the test-tube being held as horizontal as possible. When the required amount has been allowed to run in, the pipette is withdrawn, and the cotton-wool plug reinserted. The test-tube is then held by the upper end, and swung round in order to mix the water and gelatin. This is preferable to shaking, as no bubbles are produced. After the mixture is completed, the plug is removed, the lip quickly flamed, the top lid of the Petri dish lifted just sufficiently to allow the open end of the tube to be inserted between the two lids, and the gelatin fairly quickly poured out. The lower dish is meanwhile grasped with the hand which is raising the upper lid, and the gelatin made to cover the whole of the surface. The tube is withdrawn, the upper lid replaced, and in about a minute the gelatin is solid. The plate is then labelled and placed in the incubator.

One of the most important things to know is how much water to add to the gelatin. This will depend upon the number of bacteria

present in the water, and as this is frequently quite unknown, several plates with varying quantities must be poured. If the sample of water is presumably a fairly good one, i.e., not containing more than 100 to 200 per c.c., three plates may be poured containing 0.5, 0.3, and 0.2 c.c. respectively. If there is any suspicion that it may contain up to 1,000, then six plates should be poured containing 0.5, 0.3, 0.2, 0.2, 0.1, and 0.1 c.c. respectively. If the water is suspected to be bad, it is necessary to dilute it. In order to do this, 9 c.c. of sterile water or broth are measured by means of a pipette into a sterile test-tube, and 1 c.c. of the water is added to it. After well mixing, six plates should be poured containing 1.0, 0.5, 0.3, 0.2, 0.1, and 0.1 c.c. respectively.

If we are dealing with sewage or sewage effluent, where we know there will be a very large number, much greater dilutions must be used. The plan I adopt is to take four test-tubes, A, B, C, and D, each containing 9 c.c. of sterile broth. 1 c.c. of the sewage is pipetted into A and well mixed. 1 c.c. of A is put into B, 1 c.c. of B into C, and 1 c.c. of C into D, each being well mixed before pipetting into the next, and of course using a separate sterile pipette for each. Then gelatin plates are poured containing 1.0, 0.5, 0.3, 0.2, 0.1, 0.1 c.c. of D. The result per c.c. multiplied by 10,000 will give the number in the original sewage.



FIG. 2.—EFFECTS OF TOXINS ON ADJACENT COLONIES.

At first sight it would appear that the error due to this great dilution would far exceed that due to the difficulty of counting a large number of colonies. If that were all there is, I think, no doubt that it would be so, but that is not all. When colonies are crowded together on a plate, all the organisms which under favourable conditions would develop do not do so, and as a result only the quick-growing bacteria have a chance of growing, because the bacteria in their immediate vicinity are prevented from growing on account, at any rate in some cases, of the toxins which the hardier colonies produce, which are absorbed by the gelatin. One can often see very excellent examples of this when a colony of an organism which spreads on gelatin comes into the neighbourhood of another colony, as above, where the crenate-spreading edge is

not formed close to another colony. If this will happen on a plate with only comparatively few colonies, it must happen when they are very numerous.

An actual experiment will easily prove my contention. I had a sample of sewage effluent which I diluted ten times and also a thousand times. I poured three plates of each of these, all containing 0.1 c.c. of the dilution. The average of the three plates of the first dilution was 3,860, and that of the second lot 460. From the first estimation the effluent contained 386,000 organisms, and from the second 4,600,000 per c.c.—that is, there were more than ten times as many found by thoroughly diluting.

The Temperature and Period of Incubation.—When the plates have been poured, they should be placed in a properly regulated incubator. The temperature usually selected for the cold incubator is 20° C. At this temperature the majority of organisms grow fairly well. It is customary to examine the plates at the end of every twenty-four hours, in order to see whether there is an excess of liquefying colonies which might liquefy the whole of the gelatin, and so render examination impossible. When it is possible to do so they should be allowed to incubate for three or four days. As, however, there is always a danger of the liquefaction of the plate by the end of the fourth day, I always enumerate on the third day for purposes of comparison, but re-enumerate on the fourth, fifth, or sixth day if this be possible.

When no incubator is available, the results are very unreliable except in the warm weather. In the winter the temperature of the laboratory varies so greatly that if the plates are kept in a cupboard they are warm for about ten or twelve hours, and cold for the remaining twelve or fourteen. Many bacteria multiply only very slowly or not at all below 14° or 15° C., so that the result of this treatment is that the bacteria are growing only thirty-six instead of seventy-two hours, and of course nothing like all the colonies are visible at the end of this period.

The Enumeration.—The accompanying figure is the reproduction of a disc printed upon paper which is placed under the plate. The plate is placed in the centre, and the colonies are counted by the aid of a hand-lens multiplying three diameters. It is advisable to count all the colonies, but if these are numerous a half or a quarter of the plate may be counted instead, and the result multiplied by two or four.

I think I have said enough to show that the enumeration of the organisms in water by means of gelatin plates is not the casual kind of examination which one would anticipate after reading some

of the descriptions of the process. But then the question arises, Is the amount of information which we derive from an enumeration sufficient to justify our taking all this trouble? I have heard it said by more than one bacteriologist that a mere quantitative examination is of no value. If this be so, our work has been thrown away.

We learn from our enumeration the number of bacteria which will grow on gelatin aerobically in three days at 20° C. As I have before stated, there may be many organisms present which will

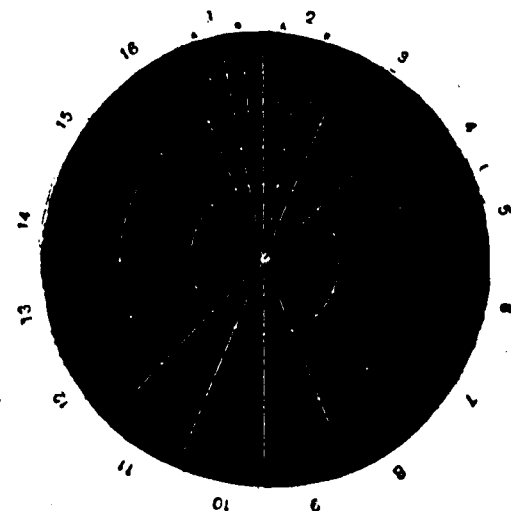


FIG. 8.—COUNTING DISC.

not grow under these conditions, so that it is very desirable to know whether there is any relation between the number growing on gelatin plates and the number which grow under other conditions.

I have examined upwards of 800 samples of water by the above method. Many of these have very different sources, and I have examined many samples from the same sources. This has entailed the pouring and examining of between three and four thousand plates, and I think that one is justified in drawing some conclusions from numbers such as these.

Of the various micro-organisms which I have mentioned above as being possibly present in any sample of water, the most important to us are the organisms which grow at 37° C. either aerobically or anaerobically, since these alone can be pathogenic to man. Later, I shall quote some of my experiments, giving the exact figures. Suffice it to say that I am convinced that if there are only a few

colonies per c.c., as found on the gelatin plate, there will be very few on agar plates, and seldom even one which will grow anaerobically. Moreover, as the number of colonies of the first group increases, so will the number of the other groups increase, and, in my experience, in the same ratio—that is, we get figures something like these:

Number of Bacteria per c.c.		
Growing at 20° C.	Growing at 37° C.	Growing anaerobically.
20	2	0
200	20	1
500	60	3
1,000	150	5
20,000	1,000	25 upwards.

It is well known that the chemical composition of a good and safe water is very constant, and this is also the case in the number of bacteria present. For instance, one sample of water I examined six times during a period of fifteen months. I found on these six occasions 52, 24, 55, 61, 48, and 60 colonies respectively.

One of the first signs of sewage pollution in a water-supply is the increase in the number of bacteria. This increase can be detected before the chemical analysis shows any detectable difference. Unfortunately, the pollution of the source is not the only factor in the increase of the number. Any water-supply which is affected by the summer temperature will show more organisms during the warm weather than during the cold weather. But when the water is at a depth sufficient to maintain it at the same temperature all the year round, then it will be found that the first sign of danger detectable is the increase in the number of bacteria. This increase is almost always quickly followed by the presence of organisms (such as the *B. coli communis*) which were previously undetectable.

Any sample of water which shows a great variation in the number of bacteria present from time to time must be considered just as unsafe as one which shows variations in the chemical composition.

2. *The Qualitative Examination.*—It would serve no purpose to give an account of all the organisms which have been found in samples of drinking-water. Much information, however, can be gained from the presence of certain of these.

Moulds are not uncommon, especially in subsoil water, and water exposed to the air, such as upland surface and river waters. In deep wells they are rarer. In the great majority of cases the number of moulds is very small in comparison to that of bacteria.

In order to detect their presence, it is usually only necessary to pour the gelatin plates in the usual way. At the end of two or three days small colonies may be seen under the hand lens, which on the surface appear to be quite dry. If these are looked at under the low power of the microscope, the hyphæ will be very distinctly seen. Owing, however, to the alkalinity of the medium usually employed, these organisms do not grow as well as on the other media; some, in fact, grow very badly. If, therefore, it is desirable to determine the number of moulds present, we should use a medium upon which these organisms will grow well. We have this medium in beerwort gelatin.

Beerwort gelatin is made by dissolving the gelatin in beerwort to the extent of 10 per cent., and when the solution is complete, and the fluid is hot, sufficient $\frac{N}{1}$ NaOH is added to bring the gelatin to the same degree of acidity as the original beerwort. It is then filtered, run into test-tubes, and sterilized fractionally. In using this medium, the procedure is identical with that adopted for ordinary gelatin.

When beerwort gelatin plates are poured as well as ordinary gelatin plates, we get a very approximate idea of the number of moulds present. As will be seen by the subjoined table, the proportion of moulds is not always small. On several occasions I have found a large number of moulds, and at first I was at a loss to account for it. On one occasion I had examined a sample of water from a superficial well, and upon examining the well I found what I think is an explanation. The well was lined only with bricks and mortar from just above the usual level of the water, which was subject to somewhat considerable fluctuation. On the bricks was found a considerable growth of moulds, the spores of which had evidently fallen into the water. Since then I have always looked upon the presence of any considerable excess of moulds as a sign of a badly made well. I suggested this in one case where I did not know anything about the well, and it turned out that I was right.

No. of organisms per c.c. by gelatin plate method.	No. of moulds per c.c. on beerwort gelatin.
58	2
78	8
376	115
912	186

Blastomycetes, both yeasts and torulæ, are not, in my experience, commonly found in water, and, so far as I know, they have little significance. They should be looked for on the beerwort gelatin plates, since they flourish exceedingly on this medium.

Of the thermophilic and nitrifying bacteria, and their connection with water, we know practically nothing. There is no doubt that they are to be found in water, but what significance they have is not known.

The number of different kinds of bacteria found in water which will not grow if they are subjected to a temperature much above 20° C. is large. Probably the number of known organisms is not so large as one would suppose by looking through the literature on the subject. This is because many of the organisms which bear several names are probably identical. This arises, I think, from two reasons. Firstly, just as a man cannot be considered a really great histologist unless he has modified someone else's microtome, no one can be a great bacteriologist unless he has some wretched bacterium named after him. Many of those who do a little bacteriology hope that the converse will be true, and that if they name only one bacterium which they have isolated from some specimen of water they will be great. Secondly, even these great men who name the bacterium after themselves do not always take the trouble to give a sufficient number of reactions that any other worker can identify it.

The following is a description from Frankland's micro-organisms in water, and I have chosen it because it is the description of the author:

BACILLUS VERMICULARIS.

(LIQUEFIES GELATIN.)

Authority.—Percy and G. C. Frankland, "Neben einige typische mikroorganismen in Wasser und in Boden." *Zeitschrift f. Hygiene*, vol. vi., 1889, p. 384.

Where found.—In water from the river Lea, near Chingford.

An organism obtained from water, and subsequently described as *B. vermiculosus* by Zimmerman, is doubtless identical with this.

Microscopic Appearances.—Large bacillus with rounded ends, in length about 2 to 3 μ long, and about 1 μ broad. Forms extensive vermiciform threads. Produces oval spores about 1.5 μ long, and 1 μ broad. It is not motile.

CULTURES.

Gelatin Plates.—The colonies in the depth are irregular in contour. This irregularity increases as the liquefaction commences, and the colony approaches the surface. The periphery is seen to consist of closely packed wavy bands of bacilli, whilst the centre of the colony looks irregular and wrinkled.

Gelatin Tubes.—Forms a moist shining gray expansion, whilst in the depth the path of the needle is indicated by a slight, sword-like growth. Slow liquefaction of the gelatin takes place.

Agar-Agar.—Produces a smooth, shining, grayish expansion, which only extends slowly.

Potatoes.—Produces a thick, irregular, flesh-coloured pigment.

Remarks.—Powerfully reduces the nitrate to nitrite.

It will be seen that the identity of this organism depends, according to the above description, upon the characters of the superficial colonies on the gelatin plates, since there is no other feature or features not shared by many bacilli. This single characteristic may be sufficient for the author when he finds an organism which he wishes to identify, but for us who have not seen the actual colonies the above description is totally inadequate. The growth on potato appears to be peculiar, but the description is unintelligible. I cannot understand what a 'thick irregular . . . pigment' can be.

In my opinion, the shortest description of any value to other observers should include the following:

Description of a Bacterium.

1. Classification, i.e., bacillus, coccus, vibrio, cladothrix, etc.
2. Motility.
3. Flagella. Number and method of staining.
4. Spore formation.
5. Pleomorphism.
6. Staining reactions.

Cultures—

- | | | |
|---------------------------------|-----------|-----------|
| 7. Upon broth. | At 37° C. | At 20° C. |
| 8. " agar. | " | " |
| 9. " blood serum. | At 37° C. | At 20° C. |
| 10. " potato. | " | " |
| 11. " milk. | " | " |
| 12. " glucose broth. | " | " |
| 13. " lactose " | " | " |
| 14. " nitrate " | " | " |
| 15. " inorganic media. | " | " |
| 16. " gelatin streak or stab. | At 37° C. | At 20° C. |
| 17. " " shake. | " | " |
| 18. " " plates. | " | " |
| 19. Under anaerobic conditions. | " | " |

Production of—

20. Acid or Alkali—in what media and in what amount.
21. H₂S.
22. Free gas (nature of and from what media).
23. If growing at 37° C., pathogenicity (and for what animal pathogenic).

Of all the diseases associated with the consumption of water, the most important and most frequently occurring is, in this country at least, enteric fever. Generally speaking, this disease may be said to be spread (so far as it is spread by water) by water which has been contaminated with the excrement from an enteric patient. It seems—at least, in the present state of our knowledge concerning

the life-history of the *B. typhi abdominalis*—that it would be well-nigh impossible to become infected from water which had not been specifically contaminated. The circumstances surrounding all such contamination necessitate that many of the other bacteria present in the dejecta must get into the water-supply at the same time as the *B. typhi abdominalis*, for we have seen before that in the faeces themselves this organism holds a very inferior numerical position to the *B. coli communis*. With every typhoid bacillus present in any water-supply there will be, therefore, scores of other bacteria derived from the faeces, including many colon bacilli.

This fact must not be lost sight of because in our examination we may, and probably shall, fail to find the *B. typhi abdominalis*, but we may nevertheless discover distinct evidence of sewage contamination.

The difficulties attending the isolation of the *B. typhi abdominalis* from water are extremely great, and chiefly for three reasons. First, these bacilli are probably present in only small numbers, and in order to include one or two we should require to deal with litres of water. The impossibility of doing this necessitates the concentration of the bacilli in order to get them included in a sufficiently small quantity of water to be easily handled. There is no method at present of concentrating the *B. typhi abdominalis* without at the same time concentrating the other bacteria present, so that, as will be seen shortly, we do not better our position much. Secondly, this organism does not live very long in water, especially in the presence of "stronger" organisms. It must often happen, therefore, that they have disappeared from the water by the time it is examined, for its presence is never suspected until there is a case of enteric fever, which must be at least fourteen days after the infection of the water. The spring which was the cause of the Maidstone epidemic was not examined until quite a month after its infection. Thirdly, this organism will always be found in conjunction with the *B. coli communis*, and this fact adds greatly to the difficulties, for I know of no medium upon which the *B. coli* does not grow more quickly than the *B. typhi*. As the former begins the race numerically stronger, it rapidly gets out of all proportion to the latter. Even this is not all, for the *B. coli* in its growth produces a toxin which is inimical to the growth of the *B. typhi*. This is easily proved.

I took about 100 c.c. of ordinary broth and inoculated it with *B. coli*, and allowed it to remain in the incubator at 37° C. for twenty-four hours. I then filtered it through a porcelain bougie, and collected the filtrate in several test-tubes. These I inoculated

singly with the *B. coli* and the *B. typhi*, using various strains of each. In every tube inoculated with the *B. coli* there was a growth at the end of twenty-four hours. In none of the tubes inoculated with the *B. typhi* was there a growth even at the end of a week.

The methods usually employed for the isolation of the *B. typhi* are the carbolic, Parietti's and Elsner's. These are so well described in the text-books that I shall not trouble you with them, but will give you my experiences with them.

The Carbolic Method.—The *B. coli* will grow slowly on carbolic gelatin at 20° C.; at the end of two or three days very small colonies can be seen. In carbolic broth at 37° C. a growth takes place in twenty-four hours. The *B. typhi* on the gelatin at 20° C. only produces pin-point colonies at the end of a week, or does not grow at all. Neither the gelatin nor the broth will prevent every water organism growing. If the amount of the carbolic acid in the gelatin is reduced to such an extent that the *B. typhi* will grow easily, many of the common water organisms will do so. The same remark applies also to the broth. This method, then, in my opinion, is only of value for the isolation of the *B. coli*. I shall add a criticism of the method for this purpose later.

Parietti's Method.—I have found this method rather less satisfactory for the *B. coli* than the previous method, and just as hopeless for the *B. typhi*.

Elsner's Method.—When Elsner first described this process, I began to try it, and was very pleased with the results. Both the *B. typhi* and the *B. coli* developed, while very few of the common water bacteria did so. I was soon, however, disappointed to find that on a succession of occasions the plates were crowded with colonies, many of which were liquefying the gelatin. Thinking that I must have made some mistake in making the medium, I destroyed the whole batch and made more. This, as well as the two succeeding batches, were no better. I have reluctantly come to the conclusion that the potato is the most important factor in the success of the method, and as yet I have failed to find the kind of potato which will always succeed.

*A New Method.**—Soon after Elsner's method was published, I was making experiments with water organisms concurrently with others with the *B. typhi* and the *B. coli*. I noticed a series of facts which have been noticed both before and since, and these induced me to experiment further. The facts I observed were that only comparatively few of the ordinary water bacteria will grow at 42° C.,

* Part of the expenses of the research in connection with this method was defrayed by a grant from the British Medical Association.

and still fewer under anaërobic conditions. The *B. coli* and the *B. typhi* both grew under each of these conditions. When the conditions are combined only a very few bacteria will grow except members of the coli group (*B. coli communis*, *B. typhi abdominalis*, and *B. enteritidis* of Gärtner) and, of course, some of the strict anaërobes. The next step was to see if the coli group would grow in the presence of these strict anaërobes, and I found that they would. The final experiment was to see if it were possible to isolate the *B. typhi* from a mixture of *B. typhi* and *B. coli*. I must confess that I found great difficulty, and I have both succeeded and failed. This much can, however, be said, that the conditions are such that the *B. typhi* can grow well, and this is not so in the carbolic and Parietti methods.

I have elaborated the method chiefly in connection with the presence of the *B. coli*, and in the following description I shall speak only of this organism, but it must be remembered that the plates should always be very carefully examined for any colonies which might by any chance be those of the *B. typhi*. If any such are seen, they should be sub-cultivated and fully worked out as to their morphological and cultural reactions.*

1. *The Medium*.—The medium I use is glucose formate broth, the medium described by Kitasato for the growth of anaërobic bacteria. To ordinary meat infusion are added 1 per cent. peptone, 0.5 per cent NaCl, 2 per cent. glucose, and 0.4 per cent. sodium formate. When these have been all dissolved by heating, the medium is neutralized, and after neutralization 2 c.c. of $\frac{N}{1}$ NaOH are added. The broth is then boiled in the steam sterilizer for twenty minutes, filtered, poured into the test-tubes, and sterilized for twenty minutes on the day it is made and the two succeeding days.

2. *The Anaërobic Conditions*.—I have tried growing in Buchner's tubes and in hydrogen, and, as I found that the former appeared quite as satisfactory as the latter, I have adopted that method throughout. A little practice is sufficient to enable one to perform the operation with the pyrogallie acid and soda quickly.

3. *The Subsequent Procedure*.—After a certain quantity of the water has been added to the broth the test-tube is placed in a Buchner's tube, which is placed in the incubator at 42° C. for from eighteen to twenty-four hours. At the end of this time the tubes are examined, and any which show signs of growth are taken out of the tubes. Those which show no growth are replaced for a

* I found, after I had been using this method, that Theo. Smith has suggested anaërobic conditions for the isolation of the *B. coli*.

further period of twenty-four hours, and if at the end of this time there be still no growth, for a third twenty-four hours. If there be no growth after seventy-two hours the tube is thrown away.

The tubes which show any growth are further cultivated. Ordinary gelatin is used for plates, the three gelatin tubes being inoculated in the usual way—i.e., one loopful of the broth cultivation is placed in the first gelatin tube, two loopfuls of this into the second gelatin tube, and four loopfuls of this into the third. The gelatin is then poured into Petri dishes, allowed to set, labelled, and placed in the incubator at 20° C.

Agar plates may also be made.

The glucose formate broth cultivation is examined microscopically, and if it appears to be pure, agar, gelatin, broth, and milk-tubes may be inoculated directly from it. It often happens that the tubes inoculated directly in this manner show only one kind of colony.

The gelatin plates are carefully examined from day to day, and any suspicious colonies are subcultivated and worked out.

4. *The Quantity of Water added to the Broth*.—In examining a sample of water for the *B. coli*, it is necessary to examine both large and small quantities. I therefore collect samples of the water in the 1-oz. bottles previously described, and place them in the ice-box until they are in the laboratory, and also a sample in a sterile Winchester quart bottle.

As I have before intimated, it is obligatory that the water should be concentrated, in order that it may be easily handled. This is usually done by filtering through a porcelain bougie, and the method generally described is one in which the water is filtered from without inwards, and the bacteria which are arrested on the outside surface are brushed off into sterile water. This method has many disadvantages. The bougie must be fairly large or else the filtering takes such a long time; the brushing of the bacteria off is clumsy, and the amount of water necessary to make the subsequent emulsion considerable. If two litres are filtered and the bacteria washed into 50 c.c. of water the concentration is only fortyfold.

The method I employ is as follows: A small bougie is used, and the filtration is from within outwards. As this is very slow, it is necessary to exert pressure as well as suction. The apparatus, of which the appended figure is a section, was made for me by Messrs. Baird and Tatlock. It consists of a brass cylinder with two shoulders. The neck at each end is provided with an opening with a screw thread. Into the top screw fits a nut carrying a manometer; into the bottom a brass box carrying the small bougie. Leakage is prevented by means of the indiarubber washers shown in the diagram.

Into the top shoulder a tube is inserted with a tap. The whole of the brass work is tinned both inside and outside.

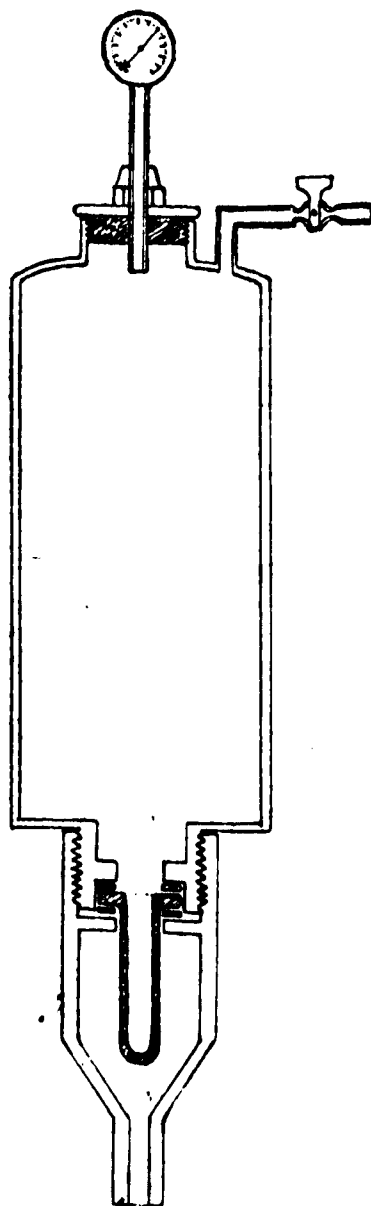


FIG. 4.—FILTRATION APPARATUS.

In order to sterilize the apparatus the bougie is put in place, and the box is screwed on loosely. The manometer is removed, and the whole apparatus heated in the autoclave at 120° C. for twenty minutes. It is then taken out and allowed to cool. The box carrying

the bougie is now screwed tight and the water poured into it. In order to do this, the neck of the Winchester quart is well flamed and inserted into the neck of the cylinder. The Winchester quart is then inverted and the water allowed to run in. As the water is running in the air is forced out, and no accidental contamination is likely to take place. When the bottle is empty the nut carrying the manometer, having been held in boiling water for a short time, is screwed in. The tube is connected with a gas cylinder, and the tap is opened to allow the compressed air to enter. The pressure is kept at forty-five pounds. The tube at the bottom of the box carrying the bougie is connected with pressure tubing to an aspirator. Two litres take rather less than twenty minutes to come through.

When all the water has run through, the bougie is removed and the mouth plugged with sterile cotton-wool; 10 c.c. of sterile water or broth are now poured into the bougie, and the bacteria are brushed into the broth with a special sterile test-tube brush. When this is completed the brush is removed and the cotton-wool plug reinserted. The organisms originally present in 2,000 c.c. are now contained in 10, *i.e.*, the water has been concentrated 200 times. Any fixed volume of this emulsion will therefore represent 200 times its volume of the original water; 0.1 c.c. will represent 20 c.c. and so on.

At this stage, therefore, we have an ounce of the original water and the emulsion representing two litres. A series of glucose formate broth-tubes is then inoculated as follows:

	The 1st contains	1 c.c. of the water	=	1 c.c. water.
" 2nd "	1	"	=	1 "
" 3rd "	5	"	=	5 "
" 4th "	5	"	=	5 "
" 5th "	0.1	" emulsion	=	20 "
" 6th "	0.2	"	=	40 "
" 7th "	0.5	"	=	100 "
" 8th "	1.0	"	=	200 "
" 9th "	1.0	"	=	200 "
" 10th "	2.0	"	=	400 "
" 11th "	2.0	"	=	400 "
" 12th "	remainder.			

The tubes are then placed in the Buchner's tubes and incubated. The advantage of this method in addition to those already stated is that it is more delicate. I will give one experiment, out of many that I have tried, to show this.

Instead of using all the "remainder" in the glucose formate broth, I pipetted 1 c.c. into each of three carbolic broth-tubes. The

results are as follows: Nos. 1 to 4 showed no growth. Nos. 5 to 10 showed good growths, and I isolated typical *B. coli* from Nos. 5, 6, 7, and 8. I did not plate 9 and 10. Of the carbolic broth-tubes only one showed a growth, and from this I isolated a typical *B. coli*.

By the anaërobic method the *B. coli* was present in 20, 40, 100, and 200 c.c., but not present in 1, 2, 5, 10, or 12 c.c. By the carbolic method it was only present in 600 c.c. From this I infer that the carbolic method may actually prevent all but the most robust colon bacilli from developing.

The disadvantage of the filtering apparatus is, I think, more apparent than real, for in any case some apparatus is necessary. The disadvantage of the cylinder of compressed air is easily got over by using an ordinary long bicycle pump.

I have tried this method on about 300 different samples of water, and in about 50 per cent. of the cases where I have found the *B. coli* I have found it all but pure on the gelatin plates. One must not expect to find it quite pure, because the conditions under which this organism grows do not destroy the other bacteria, but only prevent them from developing. Very occasionally something else has grown, and it becomes necessary to really examine the plates in order to pick off the colonies of *B. coli*.

The following table gives a few of the positive results I have obtained :-

No. of Bacteria per c.c. by Gelatin Plates.	Smallest Quantity of Water in which <i>B. coli</i> was found.
1,812	1 c.c.
2,144	5 "
1,904	1 "
874	5 "
820*	5 "
180	100 "
215†	5 "
88	12 "
8,000	1 "
5,200	1 "
40,000	1 "
17,408	1 "

Many samples of water, the sources of which were known and of which contamination was almost impossible, have been examined. Many which were known to be contaminated, and many suspicious ones, have also been examined. The result of these examinations has led me to the following conclusions:

Drinking water from a deep well should contain no *B. coli* in any

* Known to have been contaminated.

† The usual number for this well was 10 per c.c.

quantity: water from other sources which contains the *B. coli* in 20 c.c. or less should be condemned; that which contains the organism in any quantity between 20 and 50 should be looked upon as suspicious, between 50 and 100 as slightly suspicious, and only in greater quantities than 100 c.c. as probably safe. If no *B. coli* can be obtained from the whole two litres, I should consider it absolutely safe.

It has been often urged that the chemical examination is more delicate than the bacteriological for detecting both recent and oxidized sewage contamination. I beg to differ, and for this reason: the chemical analysis will show a certain amount of albuminoid ammonia and the absorption of a certain amount of oxygen, and will thus indicate the presence of organic matter in the water. If there be a great amount of organic matter, we say there has been sewage contamination, but it may have been contamination with purely vegetable matter for all we know. When we find the *B. coli* present in every 5 c.c. of the water, we find an organism which is almost synonymous with faecal matter; when therefore we find, as I have found, that there is one *B. coli* in every 5 c.c. in a sample of water which yields only 0.004 parts of albuminoid ammonia and uses up only 0.02 parts of oxygen per 100,000, what are we to say? When we know that on a previous occasion the figures were 0.008 and 0.01 respectively, and that there was no *B. coli* in 50 c.c., which process can be looked upon as the more delicate?

I do not wish to decry the chemical examination, because I think that both examinations should be made, but I do wish to insist that a bacteriological examination brings us nearer to the kind of contamination than the chemical. It is obvious that oxidized organic matter as evidenced by nitrates in the chemical examination is absolutely undetectable by the bacteriologist.

The Examination of Milk.—Milk, like water, may be examined both quantitatively and qualitatively, the latter examination being, of course, by far the more important.

Quantitative Examination.—Milk is an excellent medium for the growth of bacteria, and in consequence, as it is usually sold, it is teeming with them. Many are harmless, having merely fallen into the milk during its manipulation; some are, however, undoubtedly harmful, either of themselves or on account of their products.

The estimation of the number which a sample contains is obtained from gelatin-plates in a similar manner to that employed in the case of water. In the case of milk it is, perhaps, more necessary to pour agar-plates, and incubate at 37° C., since a far greater number of bacteria are present in milk which grow at this tempera-

ture than are found in water. To show that this is so, it is only necessary to mention the streptococcus which is so commonly found in milk. This organism grows only slowly at 20° C., and is very susceptible to the influence of the toxins of other organisms. As a consequence, its isolation from a mixed lot of organisms by means of plate-cultures is extremely difficult, but can be accomplished by means of fairly great dilution, and incubation at 37° C.

For the purpose of enumeration, milk must be treated as sewage. I have examined many samples of milk, and have found the numbers to vary from 30,000 to 30,000,000 per cubic centimetre. I have examined a few samples which were very carefully taken from the cow, and found only scores. Unfortunately, I have never been able to examine milk taken under aseptic precautions direct from a healthy cow. My experience of the ordinary London milk has been very unfortunate, the average of many samples being between 3,000,000 and 4,000,000 per cubic centimetre.

Since in any given sample of milk it is impossible to guess whether there will be 20,000 or 20,000,000 bacteria per cubic centimetre, it becomes necessary to pour a greater number of plates than are generally necessary for drinking-water. Having made the four dilutions, as in the case of sewage, A containing 1 c.c., B 0·1, C 0·01, and D 0·001 c.c. of the milk in 10 c.c., the plates are made from C and D. Six plates containing 1·0, 0·5, 0·3, 0·2, 0·1, and 0·1 of C, and six more containing the same quantities of D, are poured. It will be easily seen that with this great range we are bound to have some of the plates with few enough organisms to be numerable:

The Plates.

If the milk contain		20,000		20,000,000	
C (1·0 c.c.)	will contain ...	...	20	...	20,000
C (0·5 c.c.)	"	...	10	...	10,000
C (0·1 c.c.)	"	...	2	...	2,000
D (1·0 c.c.)	"	...	2	...	2,000
D (0·5 c.c.)	"	...	0	...	1,000
D (0·1 c.c.)	"	...	0	...	200

In connection with the enumeration of organisms in milk, I should like to say something about its sterilization. Everybody who has used milk as a medium must have been struck with the difficulty of sterilizing milk-tubes, more of these than of any other medium seeming to "go wrong." The pasteurization of milk is recommended as a method of sterilizing, the temperature being about 65° C. I doubt very much whether this does ever really sterilize it, and in support of this I give some experiments which I made:

A pint of milk was purchased. This was plated in the usual manner, and found to contain 9,300,000 bacteria, growing at 20° C. per cubic centimetre.

One hundred c.c. of the milk were placed in a small flask, which was plugged with cotton-wool. The flask was immersed in a water-bath, so that the level of the milk was about 1 inch below that of the water. The water-bath, which was boiling at the moment of immersion, ceased to boil, but recommenced after about three or four minutes. The milk was allowed to remain in the boiling water for ten minutes after the recommencement of boiling. After the expiration of this time, gelatin-tubes were inoculated as quickly as possible, and plates poured. The number of organisms found was 1,520 per cubic centimetre. At first sight one would think that these must have been spores, but that this was not the case was proved by the following experiment:

Ten c.c. of the original milk were diluted with 10 c.c. of sterile broth, and the mixture well shaken. The containing flask was then immersed in a water-bath, whose temperature was kept at 80° C., for half an hour. The flask was then transferred to the incubator at 37° C., and left for twenty-four hours. At the end of this time cultivations were made upon agar, broth, and glucose-broth, the latter being incubated anaerobically. All the cultures remained sterile. I tried several other samples, and found that the results were practically identical.

The conclusions to be drawn from these experiments are: (1) That ordinary milk does not contain spores in any but the smallest numbers; (2) that it is questionable whether pasteurization at 65° C. does really sterilize the milk, and when it is asserted that it kills everything but a few harmless spores, the assertion must be doubted; (3) that undiluted milk should be kept at 100° C., or even a few degrees higher, for some considerable time—perhaps half an hour; (4) that watered milk, such as is given to infants, is more easily sterilized than undiluted milk.

The Qualitative Examination.—Bacteria which are pathogenic to man may be present in milk, and may be derived directly from the cow, or may have been allowed to get into it accidentally. The most important of these are tubercle bacilli and streptococci from the cow, and typhoid and diphtheria bacilli accidentally.

The most important of these is undoubtedly the *B. tuberculosis*. This organism may be derived from the cow in one of two ways: It may come directly from the udder if the cow is suffering from tuberculous mastitis, or may be accidentally added in the shape of dried excrement when the cow is suffering from tuberculous enteritis.

In order to determine the presence of the tubercle bacillus, one of two methods may be adopted: (1) Microscopic examination; (2) inoculation.

Microscopic Examination.—The sample of milk should be well shaken, and a certain quantity of it poured into a proper sterile tube furnished with an indiarubber stopper. This should then be well centrifugalized so that the cream is in a stiff layer. By a little careful manipulation, the cream may be removed and placed in a sterile dish. The tube is then quickly inverted, so as to allow what is now the skimmed milk to run away, and leave the deposit as a layer in the bottom of the tube.

The sediment and the cream should now be spread as evenly as possible on clean coverslips, and allowed to dry. After they are dry they are "flamed," and immersed for at least five minutes in absolute alcohol. They are then washed in ether for a further five minutes, and the ether removed by a second immersion in absolute alcohol. The alcohol having been removed by washing in water, they are stained by the modified Ziehl Neelson method previously described.

Unless the fat is removed by ether or some similar solvent, it will be found almost impossible to decolourize the specimens without danger of decolourizing the tubercle bacilli.

The prepared slides should now be examined carefully and thoroughly under the microscope, care being taken that all the slide is examined. I do not think that this can be satisfactorily done without some form of mechanical stage.

When the slides are examined several things may be seen: 1. Tubercle bacilli may be present. 2. No tubercle bacilli may be found, but (a) a fairly large number of some other bacterium; or (b) a great excess of leucocytes, often amounting to pus; or (c) a considerable amount of vegetable matter and debris. 3. Nothing but a few leucocytes may be seen.

1. *Tubercle Bacilli may be found.*—In the great majority of cases these will have been derived from a diseased udder, and not from the faeces. In addition, therefore, to finding tubercle bacilli, we shall find other evidences of the lesion in the shape of pus, and sometimes also of blood. If these are found, there can be no doubt that the milk is totally unfit for human consumption.

Before leaving this subject, I should like here to emphasize what I have said before—that too much care cannot be taken in preparing and staining the films, since in bad preparations many bacilli may be found which have retained the stain, but which are certainly not tubercle bacilli. This occurs often if the fat be not removed,

and if there are masses of squamous epithelial cells on the slide. In order to say that we have found the tubercle bacillus, we must notice that the bacilli are delicate and moniliform, that they are distinctly red, and that they are surrounded entirely by a blue ground-stain. If there be any suspicion of red in the ground in the immediate neighbourhood, any red-staining bacilli must be disregarded.

2. *Tubercle Bacilli cannot be found.*—It seems almost a truism to remark that, when this is the case, we should content ourselves with stating the fact, and should not venture to say that no tubercle bacilli are present in the milk. There is, I think, one circumstance where we might be justified in drawing such a conclusion—viz., when we examine the milk of a single quarter which has been properly collected, and find either no evidence of any lesion, or evidence of a lesion caused by some other organism which we find in pure culture.

As a rule, the milks one has to examine are mixed, and may be derived from several cows, of which, perhaps, only one is diseased. When this is the case, it will be evident that in our examination we shall only have included a very small portion of the milk of this diseased cow, and although we may find some evidence of a lesion in the form of an excessive number of leucocytes, we may not be able to find any tubercle bacilli.

(a) *Another Organism may have produced the Lesion.*—I believe that quite a considerable proportion of cattle suffer from a form of simple (i.e., non-tuberculous) mastitis. In a great number of these the streptococcus of bovine mastitis can be found. I have examined many specimens of milk in which I have seen enormous numbers of streptococci in the deposit, as well as in the cream. These are, of course, accompanied by pus.

So far as I know, the streptococcus of bovine mastitis has not been shown to be pathogenic to man, and therefore it may be argued that the milk would not be harmful. To this two things may be urged in objection: First, several cases of streptococcal enteritis, occurring in children, have been recorded, and the simplest explanation certainly would be that the milk has been the cause; second, the condition of the udder, which gives abundant streptococci and pus, is an acute mastitis, and surely the secretion from an acutely diseased gland is totally unfit for consumption, especially by children.

(b) *An Excess of Leucocytes may be found.*—Normal milk contains leucocytes, as does every normal secretion. The number of these cells in the centrifugalized deposit of normal milk is small. In the

field of a one-sixth objective one or two may be seen, sometimes none. When there is a considerable excess—for instance, twenty or thirty—in the field of the one-sixth, the milk, in my opinion, becomes very suspicious. The preparations from the deposits of some samples of milk differ in no wise from the pus of an abscess. On one occasion I had such a specimen, and I asked a colleague of mine—a very excellent pathologist—if he would care to see some pus from a psoas abscess. He saw the specimen, and merely inquired if it was tuberculous.

This increase of leucocytes and even the presence of pus may occur even when it is impossible to find either tubercle bacilli or any such excess of a particular organism (as the streptococcus) which would suggest it as the cause. This condition I look upon as a more chronic form, and it may be either tuberculous or simple. It is well known how difficult it is to demonstrate the presence of tubercle bacilli in the pus from a discharging tuberculous sinus, and I think that we should be justified in condemning any sample of milk which contained pus on the ground that it was possibly tuberculous. Even if it were a chronic simple mastitis, the milk is coming from a diseased udder, and should therefore be condemned.

(c) *The Sediment may contain much Vegetable Matter and Débris.*—This may happen alone or in conjunction with the conditions described above. In itself it is of little import, but in connection with the spread of diseases such as enteric fever it is of some importance in pointing to carelessness in the collection and handling of the milk.

3. *Nothing but a few Leucocytes may be found.*—This may occur when the milk is normal, or where it has been impossible to centrifugalize the milk. It is impossible to examine milk which has clotted with satisfaction. One would therefore never trouble to examine a sample which had obviously clotted. But before this takes place there is a preliminary stage which I should designate as “microscopic clotting.” The milk is apparently quite fluid, but when it is examined after having been centrifugalized, it is found that the three layers, *i.e.*, cream, skim-milk, and sediment, are wanting, and that the contents of the tube are in a sense jelly-like. If under these circumstances what remains at the bottom of the tube after the contents have been quickly poured out be examined, often nothing more than a few leucocytes can be seen.

In order to be able to say that the milk appears to be normal, therefore, we must be careful to eliminate this microscopic clotting; it follows that if it is present none of the previous conditions can be diagnosed.

Inoculation.—The tubercle bacillus may be discovered by its action upon animals. The guinea-pig is usually chosen, as being particularly susceptible. The centrifugalized deposit is injected either into the peritoneal cavity or subcutaneous tissue of the groin. If tubercle bacilli are present, and the animal does not die through the effect of the growth of other pathogenic bacteria which may be present in the milk, a tuberculous abscess or tuberculous peritonitis will result. After the lapse of fourteen days or three weeks the animal is killed, and the typical tuberculous nodules and glands can be found.

Even by inoculation one cannot always diagnose tubercle with certainty in the case of milk. The reason for this is not far to seek. In the first place, milk not seldom contains bacteria which are pathogenic to guinea-pigs, and the animal may die in the course of two or three days from an affection other than tuberculosis. In so short a time the tuberculous lesions will not have developed to the extent necessary for their diagnosis. If the presence of these pathogenic bacteria is suspected, it is best to submit the sediment to a temperature of 56° C. for about ten minutes. Most of the bacteria other than the *B. tuberculosis* will probably be rendered innocuous by this treatment, and the latter will then be in a better position to produce the typical lesions.

In the second place, inoculation may fail to reveal the presence of tubercle bacilli in the sample of milk, for the same reason that an examination may fail to do so. If we are dealing with a mixed milk, we may not really inoculate any of the milk of the tuberculous cow.

If every sample of milk which is at all suspicious under the microscope be heated to 56° C. and inoculated into a guinea-pig, we shall, I think, have the best possible chance of finding the tubercle bacillus; but unless we are dealing with a single cow's milk a negative result will not mean that tubercle bacilli may not be present.

B. Typhi Abdominalis.—In searching for this organism the procedure described in the section on water is to be adopted, but the enormous number of bacteria present in milk makes the examination extremely laborious, and one is generally doomed to disappointment.

The Klebs-Löffler bacillus has been found in milk by taking advantage of its rapid growth on good inspissated blood-serum. The sediment from the centrifugal tubes as well as the cream is inoculated on to the serum in series. A loopful of the sediment or cream is rubbed all over the surface of the serum in one test-tube, and without reinoculation rubbed over another tube, and also over

Vallin "found it perfect"; Arnould found 10 per cent. "an uncertain means of destroying spores"; Miquel "could not kill germs in twenty days"; Dujardin-Beaumetz "found that 20 grammes of sulphur, as used in the official French fumigation, did not kill *B. anthracis*, though it sterilized tubes of vaccine"; Koch found both sulphurous anhydride (the dry gas) and sulphurous acid (when sprayed) insufficient to kill spores. ("Sterilized tubes of vaccine" I understand to mean that the vaccine lost its capacity to produce a vaccination vesicle.) Other names are given. In the Maine Report already quoted, Dr. Young gives some more precise details of Koch's work. Koch found: "In a practically gas-tight casket 1 per cent. by volume of sulphur dioxide will kill dry anthrax bacilli in twenty minutes when on threads and exposed to the direct influence of the gas, and that under the same conditions the bacilli are destroyed in two minutes when the threads are damp. Anthrax spores, however, were wholly uninjured by a four days' exposure to 6 per cent. of the gas. When dried cultures of sporeless bacteria, not more than from one-tenth to one-half millimetre thick, were exposed in a room fifty hours to sulphur dioxide, none were killed. One hour after the sulphur was lighted the percentage of sulphur in the air was about 8; one hour later it was only 1.25; and twenty hours later 0.015."* Again: "In Sternberg's experiments sporeless bacteria were destroyed under favourable conditions"; but he admits that "the conditions of success are such that it appears almost impracticable to conform to them in practice on a large scale, and it is evident that much of the so-called 'disinfection' with this agent is a farce."† Thoinot, however, maintains that for tuberculosis, glanders, typhoid fever, cholera, diphtheria, "sulphur dioxide has a disinfectant action."‡ He recommends 60 grammes for each cubic metre. But "Wolffhügel found that twice this quantity cannot be trusted to destroy even sporeless infection in room-disinfection."§ Dr. Novy (acting for the State Board of Health of Michigan) found, by strict experiment in an almost gas-tight room, that "sulphur fumes possessed little or no action on most bacteria when in the dried state. If, however, the specimens are actually wet, they will be destroyed, except in the state of the resistant forms, such as the spore stage and tubercle bacilli. For tubercle bacilli or spore-containing material, wet or dry, it is of no value. It can be used for the disinfection of rooms which have been infected with ordinary

* Maine Report, p. 862.

† "Disinfection and Disinfectants," 1898, Concord, p. 64.

‡ Maine Report, p. 868.

§ *Ibid.*, p. 864.

disease organisms. From 3 to 6 pounds of sulphur must be burned in each 1,000 cubic feet of space. The evaporation of water in the rooms where the articles are to be disinfected does not suffice. The walls, floors, and articles in the room should be sprayed with water. The room should be made perfectly tight, and should be kept closed at least twenty hours."* If these conditions are essential to success, clearly sulphur fumigation as ordinarily carried out in this country is of little or no disinfective value. These conditions of efficiency take no account of the incidental disadvantages of sulphur—*e.g.*, the bleaching of wall-papers and clothing.

The disagreeableness of the vapour is neither here nor there. That is probably an advantage, not a defect, and some maintain that the compelling power of a disagreeable smell is the main justification for continuing fumigation. I do not deny the compelling power, but I have not much belief either in the immunizing effects of uninformed confidence or in the indirect ventilation insured by sulphurous smells. No method can finally rest on such an argument. The somewhat misnamed "moral" effect of fumigation will not kill germs, and that is the beginning, middle, and end of the question.

Clearly there is a variable factor somewhere. Klein suggests that certain germs—*e.g.*, *B. subtilis*, *Micrococcus ureæ*—thrive in an acid medium, and therefore sulphur may sometimes fail. It is certain that sulphurous acid is a powerful reducing agent, and therefore may act rather as a cleanser than as a disinfectant. But the results referred to are sufficient to make one hesitate before accepting it as reliable in the rough conditions of house-disinfection. It is on all hands admitted that the dry gas—sulphurous anhydride—is itself of little value as a germicide, even in the most favourable concentration, but it has been maintained by Dr. Rideal that the moisture in the air of British climates is, as a rule, sufficient to convert the inefficient anhydride into the efficient acid. This is somewhat slender ground to form the basis of a universal practice. So far, however, in favour of sulphurous acid.

On the opposite side I give one or two facts. Professor Sheridan Delépine† found that when "large drops of typical tuberculous sputa were dried on pieces of paper and placed in various parts of the rooms to be disinfected . . . sulphurous acid was perfectly harmless so far as the bacillus was concerned. The tuberculous matter resisted the effects of exposure to sulphurous acid for a very

* Maine Report, p. 865.

† *Journ. of San. Instit.*, January, 1898, p. 408.

considerable length of time, and showed no marked loss of vitality or virulence." Dry chlorine gas produced little effect, but 1 per cent. hypochlorite of lime solution was found extremely potent. Even when anthrax spores were tried they were killed in a few minutes. It is a fair inference that both sulphurous acid and chlbrine are most potent in solution. If these facts are so, it seems to me utterly futile either to rely on sulphur fumigation or even to use it as a preliminary when a house has to be disinfected for tuberculosis. Possibly the tubercle bacillus, as it resisted the ordinary methods of staining, is specially resistant to certain germicides, and therefore cannot be taken as typical either of staining or disinfection. Before, however, I come to the practical deduction I wish to make, I should like to give an instance to cover other than tubercle and anthrax, which, after all, are comparatively uncommon germs in routine disinfective work. In the Maine Report* are recorded some experiments with sulphur fumigation. The experimenters—Professors F. C. Robinson and B. L. Bryant—were testing the value of formaldehyde, and as a "comparative experiment in room-disinfection, 12 pounds of roll sulphur were obtained for one of the same rooms used in the aldehyde experiments. This has a capacity of rather more than 2,000 cubic feet. The sulphur was placed in an iron kettle, and this in a copper tank filled with water so that the water came up around the kettle above the top of the sulphur. The sulphur was wet with alcohol and set on fire, and the room closed as tightly as possible. Diphtheria and anthrax cultures soaked into bits of blanket were placed about the room, some free and others in packets. Twelve hours afterwards the sulphur was found still burning, and so the room was left closed for twenty-two hours. In the morning it was impossible to enter the room to collect the cultures until after the windows had been opened for some time. All the windows were covered with a heavy dew of sulphurous acid, and the Pétri dishes and cultures in the same way. Two or three litres of water had been evaporated and all the sulphur burned. Every one of the cultures grew luxuriantly after a day's incubation. This result was so decidedly positive that it was thought unnecessary to make further experiments with sulphur. It showed how utterly worthless this agent is by the side of formaldehyde disinfection, even when properly used in these large amounts." The contra-experiments with formaldehyde were not always absolutely successful, but the results were, beyond all comparison, better than anything I have referred to regarding sulphur.

To bring this collation of discrepancies to a point: First, to be of any real disinfective value, sulphur must be burnt in the presence of water or water-vapour; second, the efficient agent is the sulphurous acid so formed; and third, the deposit of this liquid acid on the infected surfaces is the essential part of the whole process. These appear to me fair inferences from the facts I have described. But if the deposit of the liquid acid is the essential part, why not apply it directly to walls and other infected localities by a spray or jet? Surely burning sulphur for hours is a very roundabout way of applying a liquid disinfectant to a wall. It is a vastly more simple matter to begin with the liquid and spray it directly on to the wall. Fumigation takes hours; spraying, to produce a much more definite and controllable result as to deposit of liquid, is a matter of minutes. That, however, raises the question, Is it worth while to spray on a liquid that stands the bacteriological tests so instantly? For my own part, I do not think it is, and the choking effect of the liquid acid would be even more disagreeable than formalin or hypochlorite of lime, both of which are demonstrably more reliable.

On the whole, therefore, after a fair estimate of disinfective value and practicability, I conclude that the time has now come for the discarding of sulphur fumigation. Personally, I discarded it for house-disinfection three years ago—that is, as soon as I was placed in executive control of such disinfection. For hospital-disinfection, I discarded it four years ago. I have not discovered any new facts that would lead me to revert to sulphur fumigation either for houses or for hospitals.

The detailed discussion of the remaining disinfectants I reserve for the completed paper. My endeavour here has been to clear our minds on sulphur. The remaining points are: (a) Which of the disinfectants to choose—corrosive sublimate, chloride of lime with hypochlorite, lysol, carbolic acid, or formaldehyde? (b) Which method of applying them to walls are we to choose—sponging, brushing, hosing, spraying, or, in the case of formaldehyde gas, evaporation of formalin, or repolymerizing of paraform, or partial combustion of methylic alcohol, or any of the other modes devised for flooding a room with formaldehyde or glycono-formol? One point I consider of importance in estimating any of these methods. In every case referred to, it is cubic space that is described, but if we displace the air by simple ventilation it is not cubic space that we have to disinfect; it is superficial space; it is surfaces of walls, floors, ceilings, furniture, etc. In estimating the necessary quantities, therefore, even of a gas, the primary matter is not the cubic

the population with the number of families. Further on in the same page there is reference to another method of ascertaining the number of persons in each family, but there is no indication given of any alteration in what constitutes a family. This method shows that of every 100 families in Scotland, 9.07 consisted each of one person only.

For further information, I have referred to the various official prints issued in connection with the taking of the last census. In the INSTRUCTIONS TO THE ENUMERATOR as to his duties in taking the census, prepared under the direction of Her Majesty's Secretary for Scotland, Instruction No. 4 states: "It will be your duty to deliver for each occupier or lodger in your district a Householder's Schedule. As a general rule, the term 'occupier' is to be understood to apply to the resident owner, or to a person who pays rent, whether (as a tenant) for the whole of a house, or (as a sub-tenant or as a lodger) for any distinct floor or apartment." Instruction No. 8 gives as a case in which one Householder's Schedule must be left: "For a lodger alone, or for two or more lodgers boarding together, but not occupying the same apartment as the family with whom they lodge." Among the instructions given on p. 4 as to the mode of using the Memorandum Book, Instruction No. 8. states: "At each inhabited house, when you have ascertained whether it is occupied by more than one family or 'occupier' (a lodger, with or without a family, you will recollect, is a separate occupier), 'leave a schedule for each occupier.' From the foregoing it would seem that the term 'occupier' applies to a lodger, and is used synonymously with the term 'family.' From the ENUMERATION Book I have had an extract prepared showing how each family is to be distinguished by the enumerator.

If, as would seem, a lodger is reckoned as a separate family, then it will at once be conceded that the information given in the abstracts as to the number of families, the number of persons in each family, etc., is not serviceable to health officers, and, like the information given under "houses," is somewhat misleading if "family" and "house" be understood in the popular sense of these terms. Once more would I refer census authorities to the Valuation Roll, and also to the method of registering lodgers separately for voting purposes.

It is to be hoped that the new sanitary areas formed under the Local Government Act, 1889, will be distinctly recognised in the coming census. It seems to me absolutely necessary that each local authority under the Public Health Act should be able to obtain all the scheduled information collected for the areas under

their administration. If the Legislature considers any existing sanitary area not too small for administrative purposes, and if vital statistics, corrected for age, etc., are still to be recognised as a measure of sanitary progress, then it follows that the Legislature should provide the statistical information necessary for every sanitary area irrespective of its size!

With regard to the divisions of sanitary areas, for which information should be given, the parish is already recognised; but it would

General Instruction to the Enumerator

3. Under the name of the last entered person in each house (as defined in II 6 of the Instructions in your Memorandum Book) draw a strong black line across the entire column headed "Name and Surname" as is the example on the opposite page, to separate the inmates from those of the house next following, and where there is more than one occupier in the same house, draw a similar line half-way across the column to distinguish each family, as is the example. [NOTE - A lodger, with or without a family, is to be considered as occupier.]

Fac-simile Extract showing how Families are recorded

No. of Schedule	Road, Street, etc., and No. or Name of House	HOUSES		Name and Surname of each Person	Relation to Head of Family
		Inhabited	Uninhabited		
6	5. Do.	1		James D. Bruce	Head
				Marcel Do.	Wife
				Sophia White	Servant
7				Walter Campbell	Lodger
	9. Do.	12			
8	1. Bird Lane	1		John Gilmore	Head
				Anne Do.	Wife
				Thomas Johnston	Servant
9				Henry Do.	Son
				Emma Do.	Daughter
				John Do.	Apprentice
	Do.	23			

enhance the value of such statistics if, when a parish is partly burghal and partly landward, the statistics of age for each such portion were given separately. There is another area which I think might be recognised to the extent of giving the population as is presently given for small towns and villages. It will be remembered that there is at least one advantage Scottish vital statistics possess over English in respect that there has been a classification of urban and rural population and mortality from the very commencement of the Registrar-General's publications. The recognition of small towns

ON CENSUS-TAKING AND ITS LIMITATIONS.*

By J. A. BAINES, C.S.I.

THERE are, I think, few statistical questions of periodical recurrence the importance of which has been so fully recognised by us, and which have received accordingly such careful consideration at our hands, as that of how to promote the success and efficiency of our decennial census. The campaign was opened in 1840, and has since been continuously carried on whenever the operations came under official discussions. Many Fellows of the Society will recollect the instructive paper read in 1889 by our esteemed colleague Dr. Longstaff,[†] and the part taken by him and others of our number before the Treasury Committee, the chair of which was taken by our immediate past president, Mr. Leonard Courtney. It must be admitted that our efforts have not met with the success they, in our opinion at least, deserved, and that many of the suggestions which were held by us to be of the highest practical value have failed to commend themselves to the official bodies concerned. On the other hand, the attempt has not been in vain, in that it has tended to concentrate the views of many cognate societies upon definite points, and to enlist alongside of us the aid and sympathy of many who have in view the same general object as ourselves, and who can bring to bear upon it, moreover, the weight of great and varied experience.

It was in no desponding spirit accordingly that the sub-committee appointed last year by the Society considered afresh the situation, and launched the communications which have been laid before you.[‡] Some of our suggestions were new, others reiterated the old and cherished ideals. We hope to ultimately make an impression upon even the Local Government Board.

I propose now to review some of the principal factors that contribute to a successful census, from the point of view of one who has been obliged on more than one occasion to grapple with them from the inception even unto the bitter end of the operations. In the first place, it is essential in the highest degree to get an early start. If, as in this country, legislation is necessary before a single step can be taken, it is obvious that the statutory authority

* Abstract of paper read before the Royal Statistical Society, February 20th, 1900.

[†] For an abstract see PUBLIC HEALTH ii., p. 140, September, 1889.

[‡] See PUBLIC HEALTH, xi., p. 167, and p. 468 of this issue.

should be either permanent, to be used at definitely stated intervals, or at least that it should be conferred at a date sufficient to leave abundant time for the preliminary measures. Few people adequately realize the amount of preparation entailed by a general enumeration, the vast field, and the amount of detail to be covered.

The actual time required for preparation differs, obviously, in every country, not only by reason of social and geographical features, but in proportion to the permanent provision made by the State for a census. As to the latter question, I fear that recommendations for the establishment of such a permanent agency, however sound in their merits, are not likely to be favourably received just now, in either this country or in India, where it is equally necessary.

Each country has its own special difficulties and its own relative advantages in regard to the census. In the main, the difference is more prominent in the results than in the administration. Here we find a comparatively homogeneous social framework with a highly complex commercial and industrial development. In India, on the contrary, the industrial structure is of the simplest, whilst the social system and ethnic distribution are of the most complicated, the most varied, and the most elaborate that the world presents. In the former, urban conditions, in the latter rural, are markedly predominant. Hence the enumerator's area in India is greater and his population smaller than here. The general illiteracy and narrow horizon of an agricultural population not only render the supply of enumerating agency less abundant in India, but also increases the work of enumerating, since it puts out of question the practice of leaving the responsibility of filling in the schedule to the householder. On the other hand, the work of everyday administration necessitates the presence in each village community of some one official responsible for the clerical work of the whole, and thoroughly acquainted, therefore, with every house and family in the place. Then, again, there is in India no overlapping of areas. From the village, through the subdivision and district to the province, there runs one series, and the same regularity is generally found to prevail in all the older cities and most of their suburbs. There are, of course, exceptional tracts, as in the mountainous country and the comparatively recently-colonized plain of Bengal; but, for the most part, all that has to be done is the subdivision of the village and hamlet, and the separate numbering of the houses therein by enumerators' blocks, and so registering them for census purposes.

To establish order in the chaos now existing in England, to

demarcate and partition the areas into such blocks that they can be successively fitted into all the different divisions which have to be recognised in the returns, to define the limits of each, and insure an accurate knowledge of them by the enumerator—all this seems to me to be of itself an amply sufficient reason for giving a year's start to the preparations.

Owing to the general illiteracy and the incapacity of more than some two persons in a hundred to understand and correctly fill up their schedule, the Indian census authorities must provide an agency prepared to make all the inquiries and fill in the information. It is obviously impossible for a man to go his round filling in an elaborate form with information gleaned from an unwilling and obtuse subject, unless the round be a very small one. The supply of enumerators being inadequate to subdivide the rounds, we had recourse to what I venture to characterize as the most excellent device of a "preliminary record," which has been described by Mr. Hooker. The population usually resident in the house were entered on the schedule some days before the census, so that in the night itself the enumerator had only to bring it up to date in accordance with the actual facts. This, for purposes of check, he did in red ink. The interval between the two operations was purposely kept as short as possible, and just served for the schedules to be reviewed by the supervising officer of the circle.

The question often arises as to the respective efficiency of the enumeration by outside agency and that by the householder in person. To anyone who has gained experience in the matter it is simply a question of habit and temperament. In India there is no alternative. On the continent of Europe and in the States there is general uniformity, but no doubt the prevalence of official action to a very wide extent allows of domiciliary inquiries in some countries which would be resented elsewhere, and which would be impracticable in Great Britain. In Ireland, however, the matter has been hitherto left to a great extent in the hands of the constabulary, who seem to form a popular and admirable body of enumerators. There is, however, a considerable difference between the two systems in the matter of results; nevertheless, the sub-committee of the Society has suggested the assimilation of the practice in Ireland to that in this country. Setting on one side this last consideration, I doubt if the change will prove of much moment.

Assuming that the arrangements for enumeration are complete, though this is a hypothesis which no census superintendent will accept until the day preceding the fateful night, there still remains the onerous and responsible task of organizing the agency and

system through which the results are to be converted into statistics. The whole scheme, like that of enumeration, has to be thought out and laid down in detail some time before it is required to be set in motion. The actual printing of the numerous sheets and forms, not to mention the labour of devising them, is a considerable burden upon the superintendent, since an adequate supply must be ready for use almost immediately after the census has been taken. The provision of competent agency, again, is no light duty, especially where the work of abstraction is centralized. Mechanical quickness and accuracy of eye suffice for the large proportion of the work, into which no question of classification involving the use of discretion enters, and for which, accordingly, a system of independent working combined with arithmetical checks provided by the sheets themselves supplies all that is wanted. For all beyond these comparatively rudimentary results a superior class of intelligence must be enlisted, forming a sort of *corps d'élite*, working on rules directly supervised by responsible control from headquarters. How far the work of abstraction can safely be decentralized is a question to be decided by local circumstances. Speaking generally, it depends entirely upon the supply of suitable clerks, combined with the equally important supply of efficient supervision. In any case, the final processes of classification and compilation must usually be concentrated into a small compass. In connection with this part of the subject an interesting question arises as to the extent to which the enumerating agency can advantageously be utilized in the further handling of the schedules. In this country their employment is carried further than in India, but not so far, I believe, as it was in Russia.

Reverting to the general question of tabulation, I may add a line or two upon the machinery most suited to the almost mechanical processes with which the operations begin. Our sub-committee has recommended the omission from the coming Census Bill of the prescription of copying the schedules into enumeration books. That this practice has considerable advantages no one who has had to handle the schedules will deny. On the other hand, it is equally within experience that, as most of the tables are based upon combinations of facts not drawn direct from each column of the schedule independently, the physical and mental strain and the chance of error are diminished by some preliminary process of analysis such as is made possible by the collection of the schedule entries for each individual on to a separate card. Simple combinations are thus materially facilitated, whilst the more complex, in which the probability of error in using a much subdivided abstraction-sheet

is obviously very high, are brought down to a far more manageable level. In these circumstances, it seems obvious that a matter entirely dependent upon technical convenience should be left to the experience and discretion of the authorities in charge of the operations. One point in connection with the use of cards occurs to me, and this is that the utmost care has to be taken in keeping the card-bundles complete for each block or other unit of tabulation, a difficulty from which the book-system is exempt.

Then, again, there is the question of the use of machinery, such as Mr. Hollerith's electric tabulator. There seems to me, perhaps wrongly, two chances of error in connection with the use of this machine, one of which, at least, could not be eliminated by mechanical contrivance. In the first place, the whole operation is dependent upon the punching of the cards used, and unless this be subjected to continuous test, either by re-doing or some other method, an initial error is established which vitiates the subsequent record throughout. Again, it has been stated to me that in feeding the machine very quickly there is the chance of missing connection in the current. Altogether, the machine, though evidently worth trying, is by no means infallible.

The weak link in the census chain is the householder in this country and the enumerator in India, and wherever the work is done by official agency; it follows, then, that the first limitation imposed upon the census is that the information asked for should be no more than the person of whom it is asked may be reasonably assumed to be willing and competent to give. The second is, that at a synchronous inquiry, such as those I have been considering, no information should be sought which can possibly be obtained by other means. The shorter and simpler the schedule, therefore, the greater the chance of complete record. The enumeration of houses and rooms, and so on, being intimately and directly connected with that of the population inhabiting them at the time in question, is a fair addition to the return. The area and tenure of land, the number of cattle, the capital and staff of industrial undertakings, and the like, appear to lie outside the scope of the inquiry, and, as in America, should be relegated to subsidiary forms, filled in at greater leisure than is afforded by the hasty visit on the morning following the census. All of them, no doubt, must ultimately be correlated with the latter, but the same may be said of half the annual returns of the State.

I now return to the question of the personal equation of the householder, in which the leading factors are prejudice and ignorance. The latter, in relation to the object and methods of the

census, accounts for the greater part of the former, leaving but a small residuum of reasoned mistrust and suspicion. Positive ignorance, or incapacity to grasp the meaning of the schedule heads and instructions, is an altogether different matter.

Perhaps the only real prejudice that remains relates to a question which has grown to be one of practical administration, and probably for this very reason the feeling has increased in strength. I refer, of course, to the return of religious denominations. This item has been for some time a feature in the Irish schedule, and though in 1891 the return was made optional, events showed that in a very small number of instances was the information withheld. It has been frequently suggested by this Society and by other authorities that the return would be useful in the case of this country also, but Mr. Courtney's Committee of 1890 reported that though from a statistical point of view the information was desirable, the Committee, mainly for political reasons, found themselves not in a position to make any recommendation regarding it. Judging from what has since taken place, it seems as if the political opposition, to giving a precise statistical form to what is now a matter of vague controversy is increasing with the use that might be made of that information in solving admitted administrative difficulties. In few other countries does this objection exist, and in several the return, combined with a few other social facts, is evidently of considerable practical value. It occurs to me, also, in connection with the prejudice that may warp a census return from the strict truth, that the controversy as regards the return of language in Wales on the last occasion may have its counterpart in other countries where nationality has entered into an acutely political phase; especially if a less-developed tongue be in danger of obliteration by one more suited to modern requirements, and has to rely for its literary support upon the products of the past, or the factitious and artificial use of it in the present day for the purpose of emphasizing distinctions that are tending towards elimination.

As to the ignorance that either cannot appreciate what is wanted in the return, or does not possess the information, all that need be said is that "custom cannot stale its infinite variety." It crops up in the most unexpected way and from the least expected quarters. It may take the form, as in the record of age and occupation, of a tendency to generalize, favouring multiples of five in the one, and wide or comprehensive terms in the other. Or, again, it may enter into minute details which equally obscure the real fact, as where a village only is entered as the place of birth, or, in India, a purely local and colloquial title of a language, or,

further, a qualifying and generally deprecatory remark against an entry of an infirmity.

Of the three main divisions into which the usual subjects for inquiry fall—vital, industrial, and economic statistics—the first named invariably yields the best results in point of accuracy, since the questions involved take into account none but immediately personal considerations. Setting aside house accommodation as partly recorded on the responsibility of the enumerator, we may consider sex, age, and civil condition as the primary facts to be ascertained, and on these rest our whole superstructure of vital returns. The addition of infirmities, to the extent adopted in this country and in India, is more a concession to precedent than evidence of absolute facts, since the results are used chiefly for comparison with those collected on the previous occasion, on the assumption that the inaccuracy is about the same in scope and character in both cases. The enumeration of those incapacitated temporarily by illness, carried out in Ireland, does not seem worth the trouble, although logically connected with a return of the occupied. Birthplace, too, especially in combination with age, has its place in sanitary analysis, but, on the whole, it may be considered to be rather of the economic class, as indicating migration. Unfortunately, it is not infrequently mixed up with nationality, and this, however suitable for inquiry from an ethnic standpoint, has a background of political status about it which marks it suspect. Our sub-committee, however, have suggested an extension of the instructions which materially widens the scope of the results, though it fails to meet all the defects specified in the last census report.

In some enumerations a place is found for the record of the ability or otherwise to read and write more than one's own name. We adopted this course in India, with the somewhat unfortunate addition, as it turned out, of those under instruction. In this country there is no requisition for this fact, though in Ireland it is recorded and supplemented by subsidiary inquiry. The objection is the great probability of over-statement of the literate, especially among the elders, who will not acknowledge themselves in default before the rising generation. I agree with Dr. Longstaff that the information would be interesting if it could be obtained with approximate accuracy, but the contingency is remote.

Passing over social grades, which bulk largely in the Russian tables, and caste, which may be left to my successor in India, as it cannot be reproduced in a statistical form elsewhere, and language, which is here only a bone of contention in parts of the

Celtic fringe, I reach the main battlefield of the schedule—the question of occupation or means of subsistence. The leading point which the schedule-framer has to consider is whether the aim is simply industrial or also economic. Are only those who work or enjoy an income to be returned, or is the supporting power of the occupation or income to be recorded, and those who do not work or have no independent income to be relegated, under the heading of "dependent," to the occupation of the person who supports them? The elaborate attempts in 1891 to get a return of employers and employed by means of separate columns, to be filled by crosses, turned out so far a failure that no comment was made upon the results in the official report. The abuse of vague terms in filling up the occupation column has been already referred to by me, and, on the whole, the results justify the decision of Dr. Ogle, that detailed information as to the industrial organization of the country cannot be obtained by the machinery of an ordinary census. My experience on the two last occasions in India has brought me to the same conclusion. It is on very broad lines only that the census can deal with this intricate subject. It may, however, form the base of further inquiries by subsidiary methods such as those followed with success by our colleagues, Miss Collet and Mr. Charles Booth, but the raw material contains but little ore for direct manipulation. I say nothing here on the still more controversial subject of classification, at which all of us who have had a hand in census-taking have had their fling, I myself having been a frequent and vigorous offender. It is not the method of classifying alone, however, that is responsible for one of the most annoying defects in the results, namely, the want of distinction between maker and seller; nor, indeed, is it always the original record that is in fault, but the confusion of the two functions is an actual fact, and in the Indian census work we have had to recognise this, since it is one of the main features of the rural economy of the country. Then, too, the troublesome person with several means of subsistence, who will not record his view of their respective importance to his domestic economy, has yet to be satisfactorily tackled. This problem was simplified in India by only recognising occupations combined with agriculture, the enormous predominance of that mode of livelihood justifying the selection. This would not, of course, be the case in Europe.

There is one other point, however, which I am reluctant to leave altogether unmentioned, and that is our persistently reiterated request for a quinquennial census. In our representations we have with us the leading actuarial associations, and that important body

of energetic enthusiasts, the medical officers of health. Census after census has shown the inadequacy, in the case of small populations, of the most careful estimates and computations after the first two or three years of the decennial interval. I do not think our Society has ever pressed for an enumeration in the same detail as that required every ten years, but the minimum of sex and age would serve the purposes of stock-taking, as Sir Edwin Chadwick used to call it; and the only addition which I have ever suggested, and then only tentatively, is that of birthplace, as a test of the drift of population to the towns, if such drift there be. I have never, moreover, advocated the intermediate enumeration of India, where progress is comparatively slow and regular, except when, as in the present intercensal period, famine has been unprecedentedly prevalent. Nor, again, does there appear sufficient reason for so frequent enumeration in the States, where vast stretches of country have still to be filled up. But here, as I say, experience shows us constant ferment, shifting of local centres of gravity in the population, and changes in life values, all needing the definition afforded only by the simple enumeration I have specified. The obstacle, we recognise, is at present a serious one, more serious, indeed, than in 1890, when Lord Welby sat at the Treasury and cast forth his ice like morsels on us. Five years hence, however, the prospect may be more rosy, and hope springs eternal in the persistent breast of a scientific body.

A further topic, not far apart from the above, is the possibility of establishing a permanent census staff, since a general statistical office seems an ideal which is not likely to commend itself to our rulers, and the masses of valuable statistics that issue periodically from various sources must go unco-ordinated to the end of time, except when some energetic Fellow of this Society takes off his coat to grapple with some special phase of statistical life, and gives us the result.

I have considered the census question as more or less a national one, using India only for illustration, and omitting reference to the question of international comparison, with which I dealt in the *Journal* of the Royal Statistical Society of June, 1898. We have never put together a general compilation of the results of the census in its various branches for the empire as a whole, reviewing the differences of the climatic and political sections, and bringing home to us another aspect of the Greater Britain of which the majority of us—I wish I could say all—are so proud.

THE CENSUS OF 1901.

ROYAL STATISTICAL SOCIETY.

THE Preliminary Report of the Census (1901) Committee, appointed by the Council in April, has already appeared in the *Journal*.* The Committee in question has since been pursuing its labours, and on November 18th, 1899, it presented the following Second Interim Report. This having been unanimously adopted by the Council, was by its direction forwarded to the President of the Local Government Board, to the Secretary of State for Scotland, and to the Chief Secretary for Ireland.

CENSUS (1901) COMMITTEE.

SECOND INTERIM REPORT.

In their preliminary report, presented to the Council in May, 1899, the committee recommended the drafting of a letter to the authorities responsible for the taking of the census, renewing and emphasizing the recommendations in the report of the committee for the census of 1891, in favour of the early passage of a Census Act when a census has to be taken, and also in favour of making arrangements at the time of the Census Act for a quinquennial census, embracing at least particulars as to sex and age, to be taken five years after the decennial census.

These matters appeared so urgent, and the policy of the Statistical Society regarding them so well defined, that it was thought desirable to take action at once, a view in which the council of the society fully concurred. The committee have reason to believe that as far as the introduction of a Census Act early in the next Session is concerned, the policy of the society is receiving consideration. In the present report accordingly it is proposed to take up some further questions, chiefly those which are likely to arise in the preparation of a Census Act itself, and on which it may be desirable therefore that their recommendations should be in the hands of the census authorities while the necessary Bills are being prepared.

Date of the Census.

1. The committee recommend that the date of the census of 1901 be the night of Sunday, the 31st day of March, 1901, being one of the two Sundays nearest to the ten years' interval allowed for

* See *Journal of Royal Statistical Society*, lxii., p. 885, and *PUBLIC HEALTH*, xi., p. 677 (July, 1899).

between two censuses. It is likewise the Sunday before Easter-day, while the Sunday following would be Easter Sunday itself, and for that reason inconvenient, owing to the great displacement of population which takes place at the Easter holidays.

"Story" and "Tenement."

2. The committee recommend that in the Census (England and Wales) Act the word "tenement" be substituted for the word "story" in Section 3,* as being the more comprehensive term and more accurate. A "story" occupied separately by a householder would be a "tenement," but there may also be a "tenement" which is only part of a "story."

For a similar reason, in Section 5† the word "tenement" should be substituted for the word "story," and the word "tenements" for the word "stories." The effect would be that a householder's schedule would be left for each tenant of a separate tenement or holding, whether a "story" or not, the object which it is desired to arrive at.

Copying the Schedules.

3. The committee recommend that in Section 6 the direction that the enumerator is to copy each householder's schedule into a book provided for that purpose, should be so modified as to give the Registrar-General a discretion to dispense with such copying. Such a direction appears to the committee to lay down a rigid rule for dealing with the documents upon which the compilation of the census must be based, and they are of opinion that it will be to the advantage of the administration if no rigid rule is laid down. It is a pure question of administration how the primary documents, when once brought into existence, are to be utilized; and a hard and fast direction apparently tends to needless expense and delay in compiling the results. Were the department left quite free, it might or might not order copying into a book, and it would be free to substitute the use of cards for after-compilation, which is general in foreign countries. At any rate, nothing seems to be gained in an Act of Parliament by meddling with details of statistical administration in a manner which is found quite unnecessary in other statistical work.

The adoption of this recommendation would involve a good many consequential amendments in the Act, as the payment of the enumerators and other officers according to the Act is made dependent on the verification of the books into which the schedules have been copied; and the amount paid and mode of payment may both

* This should read, "Sub-section 3 of Section 5."—Ed. P. H.

† This should read, "Sub-section 5 of Section 5."—Ed. P. H.

have to be adjusted if copying into books is not to be insisted upon. Possibly in some districts fewer enumerators may be able to do the work if such copying is not insisted upon. The alteration, however, is not to be judged by its possible economy in some cases. Verification and supervision of the enumerators' work would still be necessary, and this must be provided for in the Act in connection with the scale of payments for the officers employed. It would be out of place for the committee, however, to suggest in detail what these consequential amendments should be, as they are obviously questions for the department and the Parliamentary draftsmen, if once the recommendation to abandon the hard and fast direction to copy into a book is adopted.

The committee understand that this recommendation is in accordance with the existing practice in Ireland.

Unoccupied Houses.

4. The committee recommend an amendment in Section 7, with a view to obtaining an account of the number of "occupied" houses which are not "inhabited"—that is, in which no persons slept or abode on the census night. The amendment, it is proposed, should take the form of an addition at the close of the clause after the words, "all other uninhabited houses," of words to the following effect: "distinguishing those that are occupied from those that are unoccupied."

The Section, as amended, would then run as follows: "Every enumerator shall also take account of the inhabited houses, and of the houses then building, and therefore uninhabited, and of all other uninhabited houses, distinguishing those that are occupied from those that are unoccupied within his division."

It appears to the committee unnecessary to go into details as to this recommendation, as the necessity of distinguishing between uninhabited houses that are legally "occupied" and those that are not so "occupied" is obvious. The distinction, it is understood, will be especially useful in connection with the comparison of the numbers of houses as returned in the census with the numbers of houses on the rate-books.

Uniformity of the Schedules in the three Kingdoms.

5. The above recommendations apply specifically to the Census Act for England, but the committee wish it to be understood that they should be applied, *mutatis mutandis*, to the Census Act for Scotland and Ireland, so as to have as much uniformity as possible throughout. For the same reason the committee would recommend

strongly that the schedules in the three kingdoms should be as far as possible uniform, the responsible departments consulting together. The existence of different ministerial departments for taking and compiling the census in each country is from this point of view to be regretted; but the good feeling and patriotism of the separate Ministers should be specially appealed to in a matter like this, which involves no politics.

It should be understood, of course, that the recommendation of uniformity does not extend to the omission from the census of one of the three countries of particulars which have long been obtained without objection, and which it may seem desirable to continue—such as the particulars as to religious profession in Ireland. The schedules may remain substantially uniform in all other respects, although one includes a subject not dealt with in the others.

The form which it would seem most desirable to follow for all the three kingdoms appears to the committee to be the schedule for England and Wales. The bulk of the population of the United Kingdom being in England and Wales, it is reasonable, when uniformity is introduced, that the forms now used for the majority should be followed as far as possible throughout.

British and Foreign Subjects.

6. The committee recommend that in col. 10 of the schedule the heading should read as follows: "If born in foreign parts, state if British subject, naturalized British subject, or foreign subject."

At present no specific statement as to the individual being a foreign subject is required, that depending apparently upon an inference from the statement as to his being a British subject or not, but an explicit declaration would no doubt conduce to accuracy.

The Schedule in Ireland.

7. The committee recommend that as far as practicable the householder in Ireland should fill up the schedule himself, in accordance with the practice observed in England and Wales and in Scotland.

The committee would have preferred postponing their observations on the above points relating to the Census Act and the schedules, until they had had an opportunity of considering the whole subject of the census in connection with the tabulation and report by which the results to be obtained from the householders' schedules are finally focussed and placed before the public. But rather than delay, they believe it is the most useful course to submit to the Council at once, with a view to immediate communication

to the census authorities, if the Council approve, a few practical observations which may be taken notice of in the preparation of the Census Act and of the schedules themselves. This will not prevent a further consideration of the whole subject if other points occur to the committee in reviewing the census tables as finally published, but meanwhile it may help to secure that some important points are not overlooked, whatever additional suggestions may afterwards be made.

The committee propose now to consider mainly subjects connected with the tabulation of the census and the report to be made by the census authorities, with any other matters bearing on the subjects of their interim reports which may occur to them. The results, it is hoped, will be embodied before long in a concluding report.

R. GIFFEN

(Chairman).

PERSONAL INFECTION IN ENTERIC FEVER.—There is a disposition in many quarters to regard typhoid fever as only slightly infectious, if indeed it is infectious at all. I wish to express my very strong conviction that direct contact with the person or belongings of either a known or unrecognised typhoid-fever patient is one of the greatest factors in the spread of the disease. That certainly appears to me to be one of the lessons taught by the recent outbreak. I earnestly hope that this opinion will be accepted by all who have to deal with typhoid fever cases, and that they will neglect no single precaution against the spread of infection to others. Amongst the most important precautions are the strict isolation of the patient, thorough cleanliness on the part of the nurse, who should wash her hands very frequently, thorough cleanliness also of the patient's body and bed-clothing, and immediate disinfection of the stools.—Dr. Alfred Hill, Birmingham, Report Fourth Quarter, 1899.

DIFFICULTIES IN FIXING MILK STANDARDS.—The Committee appointed to fix a standard of purity for milk have a difficult problem to solve. They have to face, not only the question of milk naturally poor in quality, in consequence of the inferiority of the cows or the rations upon which they are often fed for the purpose of forcing a great yield, but also the considerable variation in the richness of the morning and evening milkings, caused by the wide difference in the intervals between them. The latter is the chief difficulty, because, whereas there need be no hesitation in requiring milk-sellers to keep their herds up to a fair standard, and to feed the animals so that the milk will not be impoverished, the exigencies of the supply in towns govern the periods of milking absolutely. That the difficulties are not insuperable, however, is proved by the fact that, day after day and year after year, many milk suppliers manage to satisfy town dealers who test their milk regularly. It is as much to the advantage of honest producers as to that of consumers that a fair standard for milk should be fixed by law, and they may be advised, therefore, to help the Committee by suggestions, instead of objecting to everything that may cause them a little inconvenience.—*The Standard.*

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

A MEETING of the Society was held at No. 197, High Holborn, London, on Friday, February 9th, 1900. Present: Dr. A. Newsholme (President), in the Chair, Drs. J. Howard Jones, J. Kelland, A. Ashby, W. A. Bond, Shirley F. Murphy, H. L. Bernays, Oliver Field, C. W. F. Young, W. Gruggen, J. Groves, W. H. Symons, E. F. Willoughby, Walter C. C. Pakes, George Newman, H. Beale Collins, and F. J. Allan, Members of the Incorporated Society, and Messrs. A. E. Broadberry, J. F. Helps, C. Carpenter, Drs. T. G. Roe, H. G. Felken, and Falkiner, Visitors.

MINUTES.—The minutes of the last ordinary meeting were read, and having been approved, were signed by the President.

The HON. SECRETARY read apologies for absence from Drs. Gwynn, Woodforde, T. Eustace Hill, Legge, and others.

The HON. SECRETARY reported that he had communicated the resolutions passed at the last meeting on the deaths of Sir Richard Thorne Thorne, Dr. Thursfield, and Dr. Leonard Wilde to their relatives, and read the replies received.

Resolved, the same be entered on the minutes, and they are entered accordingly.

"45, Inverness Terrace,

"Hyde Park, W.,

"January 26th, 1900.

"DEAR SIR,

"On my own behalf, and that of the members of my family, I beg you to be so kind as to convey to the Incorporated Society of Medical Officers of Health our sincere thanks for the expression of its sympathy with us in the unspeakable loss we have sustained by the death of my dear husband, Sir Richard Thorne Thorne, and also our deep sense of its generous expression of high regard in which he was held.

"I am, dear Sir,

"Yours faithfully,

"(Signed) MARTHA THORNE THORNE."

"Local Government Board,

"Whitehall,

"February 8th, 1900.

"DEAR SIR,

"The resolution passed by the Incorporated Society of Medical Officers of Health on January 12th in connection with the death of Sir Richard Thorne, K.C.B., late Medical Officer of the Local Government Board, has been submitted to each member of the Medical Department, and I have now to ask you to kindly convey to the Society the sincere thanks of the Department for the expressions of appreciation and sympathy contained in the resolution.

"Believe me, dear Sir,

"Yours very truly,

"(Signed) W. H. POWER.

"Dr. F. J. Allan."

"The Grange,

"Much Wenlock, Shropshire,

"January 24th, 1900.

"DEAR SIR,

"I shall be obliged if you will convey to the Society of Medical Officers of Health the sincere thanks of the family of the late Dr. W. N. Thursfield (my brother) for their kind sympathy, as expressed in yours of the 16th inst.

"It is a source of gratification to us all to have such an expression from his professional friends, and I beg to thank you for conveying it to us.

"Yours faithfully,

"(Signed) JOHN H. THURSFIELD."

"116, Hambalt Road,

"Clapham,

"January 28rd, 1900.

"DEAR SIR,

"On behalf of myself and family I beg to thank you for your kind letter of sympathy with us in the loss of my brother, Dr. Leonard Wilde, whose work we are glad to know was appreciated.

"Yours faithfully,

"(Signed) A. E. WILDE.

"Francis J. Allan, Esq."

The HON. SECRETARY read a communication from the President and General Secretary of the First International Congress of Medical Deontology or Medical Ethics to be held in Paris in 1900, asking the Society to appoint delegates.

Resolved the same do lie on the table.

ELECTION.—The following candidate having been duly nominated, a ballot was taken, and he was declared by the President to be unanimously elected, viz.:

AS AN ORDINARY MEMBER.

Martin, John Middleton, M.B., B.C., D.P.H., Bradninch House, Exeter.

NOMINATIONS.—A number of candidates were then nominated for election at the next meeting.

DEPARTMENTAL COMMITTEE ON MILK STANDARDS.—The HON. SECRETARY reported that he had that evening received a communication from the Secretary of the Departmental Committee on Milk Standards enclosing copy of minute of appointment of the Committee by the Board of Agriculture

"to inquire and report as to what regulations, if any, may with advantage be made under Section 4 of the Sale of Food and Drugs Act, 1899, for determining what deficiency, if any, of the normal constituents of genuine milk or cream, or what additions of extraneous matter or proportion of water in any sample of milk (including condensed milk) or cream shall raise a presumption that the milk or cream is not genuine,"

and inviting the Society to nominate a witness to give evidence before such Committee, and intimating that the Committee would be ready to hear such evidence about March 1st or 2nd next.

Resolved unanimously that the matter being of an urgent nature, the bye-laws be suspended, and the consideration of the same be now proceeded with.

Resolved unanimously, on the motion of Dr. GROVES, seconded by Dr. GRUGGEN, that Dr. Alfred Ashby be, and he is hereby appointed, a witness to represent and give evidence on behalf of the Society before the Departmental Committee on Milk Standards.

PROFESSOR HALDANE, F.R.S., then read a paper on the "Risks Attending the Use of Carburetted Water-gas for Domestic Lighting Purposes."*

At the close of the paper a discussion ensued.

On the motion of Mr. SHIRLEY MURPHY, seconded by Dr. ALLAN, a vote of thanks was unanimously accorded to Professor Haldane for his paper.

Birmingham and Midland Branch.—A meeting of this Branch was held at the Council House, Birmingham, on January 4th, 1900, at which there were present: Dr. Mabyne Read (President), in the Chair, Drs. May, Hollinshead, Chatelier, Bostock Hill, Reid, Snell, Richmond, Clark, Malet, Robinson, Meredith Richards, and Manley.

Apologies were received from Drs. Ridley Bailey, Alfred Hill, and Barwise.

Dr. MEREDITH RICHARDS read a paper entitled "Some Observations on the Purification of Sewage."*

North-Western Branch.—The ordinary monthly meeting of this Branch was held at the rooms of the Chemical Club, Manchester, on Friday, February 8th, 1900.

The following Members were present: Drs. Vacher (in the Chair), Anderson, Berry, Garstang, Harris, Porter, Sergeant, Wheatley, and Wilkinson.

The minutes of the last meeting were read and confirmed.

A telegram was read from the President regretting his inability to attend.

A vote of condolence with the family of the late Dr. Vernon, who for many years had been a Member of this Branch, was proposed and carried.

The adjourned discussion* on Dr. Anderson's paper then took place.

MEETINGS FOR MARCH.

March 9th, Incorporated Society, in London.

" North-Western Branch, at Manchester.

March 23rd, Northern Branch, at Newcastle-upon-Tyne.

* APPOINTMENT OF COMMITTEE ON MILK STANDARDS.—The following have been appointed by the President of the Board of Agriculture as a Committee to determine, pursuant to Section 4 of the Sale of Food and Drugs Act, 1899, "what deficiency in any of the normal constituents of genuine milk or cream, or what addition of extraneous matter or proportion of water in any sample of milk (including condensed milk) or cream shall . . . raise a presumption, until the contrary is proved, that the milk or cream is not genuine": Lord Wenlock (Chairman), Mr. G. Barham, Mr. G. Cowan, Major Patrick, Mr. G. Craigie (Board of Agriculture), Mr. S. W. Farmer, Mr. Shirley F. Murphy (London County Council), Professor Thorpe (Somerset House), and Dr. J. A. Voelcker. Mr. R. H. Rew, of the Board of Agriculture, will act as Secretary to the Committee.

* Will be published in our next issue.

THE DESTRUCTION OF DANGEROUS OR USELESS CARCASSES.

IN our issue of May, 1898* we gave excerpts from a Report drawn up by the Health Committee of the Corporation of Nottingham, describing the "Otto flesh destructor" then at work at Essed, and giving the results obtained from its use. We have recently been enabled to inspect at the Phoenix Fat Works, Basford, Nottinghamshire, the only plant of this description at work in this country, and we propose to give some account of our observations.

The essential parts of the machine are a fixed drum with a steam jacket and an inner perforated cylinder connected to an axle working in a steam-tight gland and driven by machinery through gearing. The carcass to be destroyed can be introduced either whole, as would be desirable in the case of anthrax, etc., or dismembered. For the former purpose the ends of both cylinders can be opened, for the latter there is a manhole at the top of the machine, a platform being provided to gain access thereto. As soon as the machine has been charged, the whole apparatus is heated by the passage of steam through the jacket of the fixed drum, and steam is then turned into the cylinder. The gas and fumes given off during these processes are led through a worm in tank, through which cold water circulates, and can be then taken through the furnace under the boiler. The condensed water, melted fat, and size are run off into two closed drums, from the first of which the fat is skimmed off by a ladle operated from the exterior of the drum. The water and size are passed through a worm in the second drum. The water and size are concentrated, and whence it is drawn off with the whereby the size is concentrated, and whence it is drawn off with the condensed water by a bib-cock. After an interval of four to five hours, the steam is shut off from the interior of the fixed drum, and is again turned on into the jacket, the perforated cylinder being set in motion by the gearing on the axle to which it is fixed. As the cylinder revolves, the flesh and bones—the latter being by this time in a very fragile condition—are ground up by passing under a heavy roller, which exerts its pressure against the bottom of the perforated cylinder. Fixed arms are provided to keep the contents of the drum continuously under the roller. When the flesh, etc., have been sufficiently dried and pulverized, the gearing can be adjusted to feed the contents of the cylinder to the discharging outlet. After exposure to the air to complete the drying, the residues can be put into sacks. The whole operation is complete in about ten hours. If the carcass be blown up with gas, the latter can be drawn off by a special form of trochar and cannula, which are connected to the exhaust pipes dealing with the fumes. The machine will hold and destroy either two or three whole carcasses of horses, or portions of carcasses up to a total weight of 20 to 24 cwt. The ultimate residues are a "dry meal," forming about 25 per cent. of a skinned carcass with the hoofs off; fat in the proportion of 6 per cent. of the carcass weight; and a small quantity of size. The last is the only waste product of the process. According to an analysis made by Mr. Trotman, City Analyst of Nottingham, the composition of the "dry meal" residue is as follows:

* See PUBLIC HEALTH, x., p. 281.

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Moisture	...	...	...	...	11.12 per cent.
Organic matter (containing nitrogen, 9.00; fat, 6.66)	...	...	...	...	64.65 "
Tricalcic phosphate	...	...	...	...	21.23 "
Alkaline	...	...	...	...	1.72 "
Iron	...	...	...	...	1.28 "
Silica, etc.	...	...	...	...	1.28 "

The fat is disposed of to soap-boilers and to makers of carriage-grease, while the meal is suitable for fowl-food or manure.

At no stage of the process should there be any offensive odour, while the heat to which the flesh is subjected insures that any disease germs are completely destroyed. The meal is in appearance a brown feltish powder containing small fragments of bone, is without odour, and is said to remain inoffensive for an indefinite period if kept dry.

We have been very favourably impressed with this machine, and consider that it offers a satisfactory means of dealing with condemned meat and any carcasses which cannot be safely dealt with in the usual manner. Moreover, it has the further advantage of giving residues which have a commercial value. It takes up but little room, and could readily be fixed as an adjunct to a destructor, which would provide the necessary steam and power at a minimum cost.

While dealing with this subject we would like to call the attention of our readers to a work on knackers' yards, by Dr. A. Morel,* which deals with the whole subject of the management of these yards, the prevention of nuisance therefrom, and all kindred matters, in a very exhaustive manner.

OIL AS A PRESERVATIVE OF MEATS.—Oil is used in the household in various parts of Italy for keeping meat fresh, and it has been used extensively for ages in preserving wines; but it has long been known that access of air is not thereby wholly prevented, and it has been proved that even the evaporation of water beneath it can proceed to some slight extent. To determine the preservative influence of oil, Dr. Constantine X. Hieroclès (*Archiv für Hygiene*, xxxiii., 155) made a series of experiments. He found that parts of a piece of ordinary beef placed in flasks, covered with oil to a depth of 3 cm., and kept at 7° C., at room temperature, and at 28° C., showed bacterial growth of, respectively, 1,845, 2,572, and 2,950 times the number originally present. Then pieces of sterile meat of various kinds were kept under the same conditions, but in all cases growth appeared after a time, though much of it originated in the oil itself, even though this had been exposed to 100° C. for half an hour. To determine the inhibiting action of oil on bacterial growth he took two fresh agar cultures of each of the following: *Proteus vulgaris*, *B. subtilis*, *B. megaterium* and *B. anthracis*, and to one of each pair he added oil up to the cotton stopper. All eight tubes were kept at 28° C. It was soon demonstrated that the growths under the oil were much less active than the others. He points out that in warm climates the method may be of advantage, since it does not interfere with bacterial multiplication, and protects the meat from contamination through contact of insects. Moreover, the outer portions are not dried up, and the whole can be used.—*American Journal of Medical Science*.

* "Des Clos d'Équarrissage: Industrie, Hygiène Publique et Professionnelle, Police Sanitaire, Législation." Dr. A. Morel, Vétérinaire Sanitaire de la Seine, Paris: Asselin et Houzeau. 1897.

LAW REPORTS.

HIGH COURT OF JUSTICE.

QUEEN'S BENCH DIVISION.

November 17th and 18th, and December 21st, 1899.

BEFORE LORD RUSSELL OF KILLOWEN, C.J., BIGHAM AND DARLING, JJ.

LOGSDON v. BOOTH.

Local Government—Common Lodging-house—Penalty for Keeping—Non-registration—Common Lodging-houses Act, 1851 (14 and 15 Vic., c. 28), Sec. 7—Common Lodging-houses Act, 1853 (16 and 17 Vic., cap. 41), Sec. 3.

The Common Lodging-houses Acts, 1851 and 1853, are sanitary Acts. A common lodging-house is that class of lodging-house in which persons of the poorer class are received for short periods, and, although strangers to one another, are allowed to inhabit one common room. The fact that such a house is not carried on as a business for the sake of profit, but as a humane or charitable enterprise, does not take it out of the measure of sanitary protection provided by the Acts, or prevent it being a common lodging-house within their meaning. The question is not with what object, or prompted by what motive, the house is carried on, but whether the house is such and is so carried on as a lodging-house as to be within the provisions of the Acts. Although a common lodging-house is "open to all comers" in the sense that practically all comers are received without discrimination, there is no obligation upon the keeper to receive them. He may refuse to admit any person he chooses to exclude.

Booth v. Ferrett (59 L. J., M.C., 136; 25 Q.B.D., 87) was wrongly decided.

Case stated by the chief Metropolitan magistrate.

On July 11, 1899, an information was laid by the appellant Logsdon, on behalf of the London County Council, for that the respondent, William Booth, on May 16th, 1899, did, contrary to the provisions of the Common Lodging-houses Act, 1853, keep a common lodging-house known as "The Harbour," Stanhope Street, in the parish of St. Clement Danes, in the county of London, without the name of the said William Booth being entered as the keeper of the said common lodging-house in the register kept under the Common Lodging-houses Act, 1851.

The magistrate dismissed the information.

The facts were as follows:

1. The house known as "The Harbour" was kept by the respondent, as one of the shelters established on behalf of the Salvation Army in that part of what is termed its "Social Work" in connection with what was called "The Darkest England Scheme," and was used for the reception and lodging of persons admitted by officials in charge of the shelter, on behalf of the Salvation Army, under a plan in accordance with certain "Orders and Regulations" made for the good government of "The Harbour," and persons so admitted were charged either 4d. a

night or 2s. a week for a bed, and the use in common with other occupants of the rooms hereinafter mentioned. The officials in charge of the shelter had such discretionary power as arose under such "Orders and Regulations" to admit persons for a less payment, or with no payment, if they thought fit so to do, and such persons when so admitted would in like manner have each a bed and the use of the said rooms. The name of the respondent was not entered as the keeper of the house in the register of common lodging-houses kept under the Common Lodging-houses Act, 1851.

2. On May 16, 1899, there were in the house 157 beds (or bunks). On the ground-floor there was an open dormitory (not divided into cubicles) containing nine bunks for eighteen occupants. On the five upper floors were open dormitories (not divided into cubicles) containing in all 137 beds and one bunk for two occupants. The bunks were placed one above the other in the same manner as berths are placed in the cabin of a ship, and were used only in those rooms where there was not sufficient floor-space to provide beds for the same number of occupants as could be accommodated in the bunks.

3. On the ground-floor of the house there were a sitting or meeting room and a kitchen, both of which were used in common by all the occupants. Any occupant when admitted was entitled to cook his food at the fire provided in the kitchen, but had to provide his own food, and was not provided by the respondent with any food in consideration of either of the above payments.

4. Only men were admitted as occupants of this shelter. Men who were drunk and disorderly were not admitted, or, if they had been admitted, were turned out.

5. The occupants of "The Harbour" were of the same class of men as those who generally sleep in registered common lodging-houses, save that some of the occupants received there were so dirty that they would not usually be received in a registered common lodging-house.

6. Evidence was tendered on behalf of the appellant which it was asserted would show (1) that if all the beds were occupied the house would be overcrowded, and (2) that the house and the beds, bedding, and utensils therein were in an uncleanly and insanitary condition. The whole of this evidence was objected to by the respondent, and it was rejected by the magistrate, on the ground that it was irrelevant to the question in issue before him—namely, whether the shelter was a common lodging-house within the provisions of the Acts.

7. The house was kept as a Salvation Army shelter by the respondent for charitable or religious objects, the keeping of the house being part of the social work promoted by a body of persons known as the "Salvation Army" in connection with the "Darkest England Scheme," and acting under the orders of respondent, and the receipts of the shelter were carried to the funds of the "Darkest England Scheme Trust" through the medium of the officials of the Salvation Army.

8. In the accounts kept by the Salvation Army of the working of all the shelters used in connection with the "scheme" for the year ending September 30th, 1898, being the last year the accounts of which were available, the receipts in respect of "The Harbour" were put down at £972 10s. 11d., and the outgoings for purchases, wages, and expenses in respect thereof at £972 11s. 8d.; and in the outgoings were included certain estimated expenses of management for work done at the headquarters of the Salvation Army at Whitechapel in connection with a

the shelters used for the purposes of the "Scheme" (including "The Harbour"), and not at "The Harbour." The same accounts showed an increase of £124 17s. 6d. in respect of the value of stock on hand on September 30th, 1898, as compared with September 30th, 1897, at divers shelters (including "The Harbour") under the control of the respondent, used in connection with the "Scheme," but it did not appear whether all or any of such increase in value was represented by stock in "The Harbour." It also appeared from the accounts that for that year on the working of all the shelters throughout England there was a loss of over £600.

9. It was proved that in common lodging-houses in the county of London which are kept for the purpose of making a commercial profit, and not for charitable objects, there are about 13,000 beds let at the same price as that charged by the respondent for beds in "The Harbour."

10. The appellant tendered the evidence of certain keepers of registered common lodging-houses who, it was alleged, could show that they had made, and still make, a profit by keeping such lodging-houses while charging the same prices for beds as those charged by the respondent; but the evidence was objected to on behalf of the respondent, and was rejected by the magistrate as irrelevant.

The "Orders and Regulations" contained a statement that the charges made were within the reach of the poorest, and that the shelters afforded the accommodation, not as a work of charity only, but on a business basis, so that the inmates were not demoralized by charity, knowing that they paid for what they had, and had only what they paid for, and that in the shelters the very outcasts of society were brought, for a season at least, into conditions of health and cleanliness. They contained provisions for holding certain religious exercises and meetings, at which attendance was not compulsory. Further, a provision that the shelters were not to be allowed to become the permanent homes of men who were able to pay for more accommodation than the shelter provided. That the shelter must not be allowed to assist idle men in their efforts to lead a lazy life, nor to become in any way a channel or means for the dissemination of disease. There were also certain provisions in the "Orders and Regulations" as to bringing influence to bear on the inmates, and as to endeavouring to find employment for them, and a number of provisions directed to the preservation and promotion of health, such as provisions with regard to air-space, avoiding wood for fitting up shelters, and caulking wood floors.

The magistrate held that the facts proved in the present case were not distinguishable from those in *Booth v. Ferrett* [1890],* and that "The Harbour" was not a common lodging-house within the Common Lodging-houses Acts, 1851 and 1853.

The questions for the opinion of the Court were:

- (1) Whether this case is distinguishable from *Booth v. Ferrett*, and
- (2) If not, whether the latter case was rightly decided?
- (3) Whether on the facts above stated "The Harbour" was a common lodging-house within the Common Lodging-houses Acts, 1851 and 1853?
- (4) Whether all or any of the evidence tendered on behalf of the appellant was wrongly rejected?

Jelf, Q.C. (*Ryde* with him), for the appellant.—There is nothing to show that the provisions of the Acts of 1851 and 1853 as to the registra-

* 59 L. J., M.C., 186; 25 Q.B.D., 87.