

**Sanitary inspectors' practical guide... : being a practical treatise on the duties of the sanitary inspector and text book to the examinations of the Sanitary Institute of Great Britain / by Joseph Robinson.**

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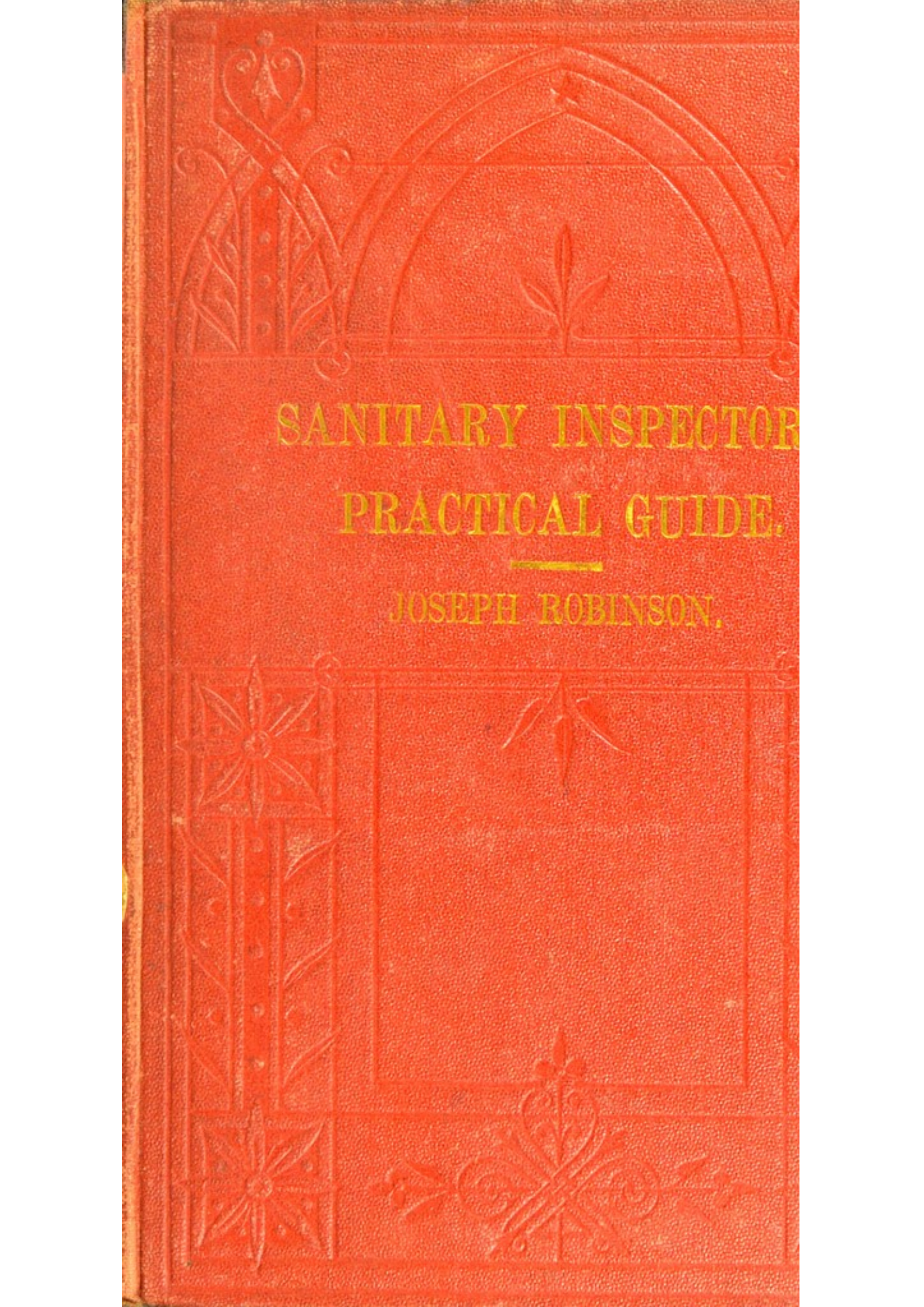
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SANITARY INSPECTOR  
PRACTICAL GUIDE.

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JOSEPH ROBINSON,

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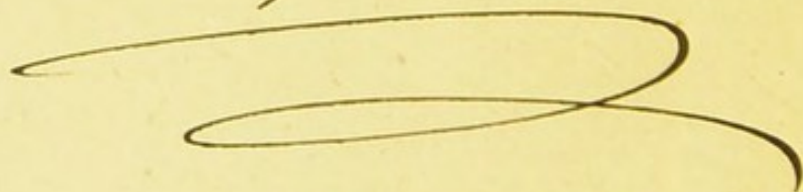
To the

Chief Sanitary Inspector  
Edinburgh

with the Authors

Compliments

Joseph Robinson



*Sanitary Inspectors' Practical Guide*

SANITARY INSPECTORS'

PRACTICAL GUIDE.

*John W. ...*

THE PRACTICAL GUIDE

TO THE STUDY OF THE  
HISTORY OF THE  
CIVILIZATION OF THE  
MIDDLE AGES

BY  
HAROLD E. PHILLIPS

PRACTICAL GUIDE

THE  
PRACTICAL GUIDE  
TO THE STUDY OF THE  
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CIVILIZATION OF THE  
MIDDLE AGES

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SANITARY INSPECTORS'

# PRACTICAL GUIDE

BY

JOSEPH ROBINSON,

*Sanitary Inspector for the Manor of Aston, Birmingham,*

(LATE SANITARY INSPECTOR, CITY OF CARLISLE),

BEING A PRACTICAL TREATISE ON THE DUTIES OF THE  
SANITARY INSPECTOR, AND TEXT BOOK TO  
THE EXAMINATIONS OF THE SANITARY INSTITUTE OF  
GREAT BRITAIN

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DECEMBER 1877.

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Author of 'The Elements of Pharmacy' and 'The Elements of Materia Medica and Therapeutics'

PHARMACEUTICAL

FOR THE TRADE AND GENERAL

BIRMINGHAM

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DEDICATED

TO THE

MEMBERS OF THE SANITARY INSTITUTE  
OF GREAT BRITAIN,

AS BEING THE FIRST PUBLIC INSTITUTION TO RECOGNISE  
THE FULL IMPORTANCE OF THE DUTIES OF SANITARY  
INSPECTORS, AND AS THE CHIEF

PROMOTERS

OF THE INTERESTS OF SUCH OFFICIALS.

## PREFACE.

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IN presenting this small work to the numerous Sanitary Inspectors and those persons interested in the welfare of Sanitary Officials, the Author desires to explain that this is not, nor does it pretend to be, a scientific work, but simply a practical guide to the daily labours of Sanitary Inspectors; and having on many occasions been applied to for information, especially by Inspectors newly appointed, and also considering that since the passing of the Public Health Act, 1875, there has not been a work of this description published, the present time was considered opportune for its appearance; and although it will be of most service to Inspectors newly appointed, many of the hints contained may be found to be of especial value to Inspectors of larger experience.

Yours truly,

JOSEPH ROBINSON.

WITNESS

I, the undersigned, do hereby certify that the above is a true and correct copy of the original as the same appears in the records of the Court of Sessions for the County of ...

Given under my hand and seal of Office this ... day of ... 18...

# SANITARY INSPECTORS' PRACTICAL GUIDE.

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## CHAPTER I.

### INTRODUCTION.

SANITARY Science and Sanitary Legislation have made rapid progress during the last few years, and in proportion to that progress the inspection of nuisances has become a work of much greater importance than heretofore ; higher salaries are offered and better men are sought for. It is therefore essential that the Inspector should keep his eyes and ears open to those matters specially connected with his numerous duties.

The information required may be divided into two classes : the theoretical and the practical. The latter class is the one to which this work is more especially devoted. The success of an Inspector does not depend so much upon the technical knowledge he may possess upon a given subject, as upon a general knowledge of the various subjects mentioned in this work ; but mostly does his success depend upon his

general disposition, his cool, persuasive, but firm and determined manner, and his activity and general business tact. It is indiscreet on the part of an Inspector when newly appointed to launch into too much, or too many kinds of work, as though to revolutionise the whole place in a few months.

The work, to be done effectually, must be proceeded with very cautiously at first, and after a little time press on quicker, as occasion may require, but at all times exercising great care. It should also be borne in mind that he who gets the most work accomplished with the least summoning, attains his object in the easiest and most advantageous manner. As to summoning persons before the magistrates, a good deal of discretion is in the hands of the Inspector, inasmuch as it will be a part of his duty to report to the Committee the non-observance of a notice, or the breach of a bye-law, or the committing of an offence under the Public Health Act, 1875; and on the information thus laid before the Committee, the groundwork will be formed for proceedings before the Magistrates.

The Inspector, I think, need scarcely be told to avoid being drawn into any malicious prosecution.

With a view of placing in the hands of the reader all information strictly bearing on the duties of Sanitary Inspectors, and to make these pages of as much practical value as possible, it has been my desire throughout that it should answer as a text-book for the examinations of the Sanitary Institute of Great Britain, as the reader will no doubt be aware that this worthy institution has commenced to grant certificates of competency to Inspectors upon their passing satisfactorily certain examinations. Their efforts in this

direction cannot be too highly commended, and it is to be hoped that the Local Government Board will soon see their way to follow the example. The following is a portion of the circular issued by the Sanitary Institute ; each of the subjects mentioned will be treated upon in the various chapters throughout the work :—

“ The examinations are open to visitors duly appointed (*a*)  
“ by the Local Government Board ; (*b*) the Institute of Civil  
“ Engineers ; (*c*) Associations of Medical Officers of Health ;  
“ (*d*) the Institute of British Architects ; (*e*) the Association  
“ of Municipal and Sanitary Engineers and Surveyors ; (*f*)  
“ the Institution of Surveyors.

“ Candidates must furnish to the Council of the Institute  
“ satisfactory testimonials as to personal character ; and give  
“ two weeks’ notice to the Registrar previous to presenting  
“ themselves for examination, stating whether they wish to  
“ be examined as Surveyors or Inspectors of Nuisances. The  
“ fee for the certificate must be paid to the Registrar, by  
“ Post Office Order or otherwise, at least six days before the  
“ day of examination. On receipt of the fee a ticket will be  
“ forwarded admitting to the examination.

“ The fee for the certificates is as follows :—

“ Surveyors ... .. £5 5s.

“ Inspectors of Nuisances ... £2 2s.

“ Unsuccessful candidates will be allowed to present  
“ themselves a second time for one fee. The examination in  
“ each case will be by questions to be answered in writing,  
“ and by questions of a practical character to be answered



“ *vivâ voce*, to include a competent knowledge of the following subjects :—

“ *For Inspectors of Nuisances.*

“ A thorough knowledge of the provisions of the Acts respecting nuisances and adulterations.

“ A fair knowledge of the principles of ventilation.

“ A knowledge of the physical characters of good drinking-water, and the ways in which it may be polluted.

“ A knowledge of the proper conditions of good drainage, as far as it is likely to affect the health of the inhabitants.

“ A knowledge of what constitutes nuisances arising from smoke, noxious vapours from various trades, callings, or manufactures.

“ A fair knowledge of the character of good food, such as meat, fish, milk, vegetables, so as to be able to recognise any obvious unsoundness.

“ Some knowledge of contagious diseases, and the reasons why persons affected by or recovering from them should not appear in public.

“ A knowledge of the best methods of disinfection and of the removal of cases of infectious disease. Methods of inspection, not only of dwellings but of markets, slaughter-houses, cow-sheds, bakehouses, and offensive trades. Of scavenging and the disposal of refuse.

“ By order,

“ LORY MARSH, M.D.,

“ Registrar.

“ 20, Spring Gardens, London, S.W., 1875.”

Section 189 of the Public Health Act, 1875, makes provision for the appointment of the Inspector of Nuisances, and at the discretion of the Local Authority such officers may be appointed, subject to the approval of the Local Government Board; it is therefore desirable that each Inspector, whether directly under the control of the Central Board or not, should be thoroughly acquainted with the prescribed duties of that body, of which the following is a copy:—

*“ To the several Urban Authorities in England and Wales, constituted by the Public Health Act, 1872 :*

*“ And to all others whom it may concern :*

“ Whereas by Section 7 of the Public Health Act, 1872, it is enacted that, subject to the provisions of that Act, the duties imposed by previous sanitary Acts, including that of appointing Inspectors of Nuisances for the purposes of those Acts, shall be transferred to Urban Sanitary Authorities constituted under the above-mentioned Act ;

“ And whereas it is enacted by Section 10 of the said Act that the Local Government Board shall have the same powers as they have in the case of a district medical officer of a union, with regard to the qualification, appointment, duties, salary, and tenure of office of officers of Sanitary Authorities, any portion of whose salary is paid out of moneys voted by Parliament ;

“ And whereas it is further enacted by the last-mentioned section that the same person may, with the sanction of the Local Government Board, be appointed the Inspector of Nuisances for two or more sanitary districts, by the joint or

several appointment of the Sanitary Authorities of such districts :

“ Now we, the Local Government Board, deeming it expedient that regulations should be made with respect to the appointment, duties, salary, and tenure of office of Inspectors of Nuisances appointed by Urban Sanitary Authorities, in all those cases where any portion of the salary of any such officer is paid out of moneys voted by Parliament, do hereby order and direct as follows :—

“ *Section I.—Appointment.*

“ Article 1.—A statement shall be submitted to the Local Government Board, showing the population and extent of the district for which the Sanitary Authority propose to appoint the Inspector of Nuisances, and the salary or remuneration intended to be assigned to him ; and where the circumstances render desirable the appointment of one Inspector of Nuisances for two or more sanitary districts, statements shall, in like manner, be submitted to the Local Government Board, showing the names of the districts to be combined for that purpose, the population and extent of each district, the mode in which it is intended that the appointment shall be made, whether jointly or severally, by the Sanitary Authorities of those districts, and the amount of salary or remuneration proposed to be assigned to the officer appointed.

“ Article 2.—When the approval of the Local Government Board has been given to the proposals submitted to them, the Sanitary Authority or Authorities shall proceed to the appointment of an Inspector of Nuisances accordingly.

“Article 3.—No appointment of an Inspector of Nuisances shall be made under this Order unless an advertisement giving notice of the day when such appointment will be made shall have appeared in some public newspaper circulating in the district or districts, at least seven days before the day on which such appointment is made: Provided that no such advertisement shall be necessary for the appointment of a temporary substitute.

“Article 4.—Every such appointment hereafter made shall, within seven days after it is made, be reported to the Local Government Board by the clerk to the Sanitary Authority, or, in the case of a joint appointment, by the clerk to one of the Sanitary Authorities by whom the appointment is made.

“Article 5.—Upon the occurrence of a vacancy in such office, the Sanitary Authority or Authorities shall proceed to make a fresh appointment, which shall be reported to the Local Government Board as required by Section I., Article 4, of this Order; but if the Sanitary Authority or Authorities desire to make any fresh arrangement with respect to the district or the terms of the appointment, they shall, before filling up the vacancy, supply the particulars of the arrangement to the Local Government Board in the manner prescribed by Section I., Article 1, in regard to the first appointment; and if the approval of the Local Government Board be given, absolutely or with modifications, the Sanitary Authority or Authorities shall then proceed to fill up the vacancy according to the terms of the approval so given.

“Article 6.—If any officer appointed under this Order be at any time prevented by sickness or accident, or other

sufficient reason, from performing his duties, the Sanitary Authority or Authorities, as the case may be, may appoint a fit person to act as his temporary substitute, and may pay him a reasonable compensation for his services; and every such appointment shall be reported to the Local Government Board as soon as the same shall have been made.

*“ Section II.—Tenure of Office.*

“ Article 1.—Every officer appointed under this Order shall continue to hold office for such period as the Sanitary Authority or Authorities appointing him may, with the approval of the Local Government Board, determine, or until he die, or resign, or be removed, by such authority or authorities with the assent of the Local Government Board, or by the Local Government Board: Provided that the appointment first made under this Order shall not be for a period exceeding five years.

“ Article 2.—Where any such officer shall have been appointed after the passing of the Public Health Act, 1872, for one or more sanitary districts, and any change in the extent of the district or districts, or in the duties, salary, or remuneration, may be deemed necessary, and he shall decline to acquiesce therein, the Sanitary Authority or Authorities by whom he was so appointed may, with the consent of the Local Government Board, but not otherwise, and after six months' notice in writing, signed by their clerk or clerks, given to such officer, determine his office.

“ Article 3.—No person shall be appointed who does not agree to give one month's notice previous to resigning the office, or to forfeit such sum as may be agreed upon as liquidated damages.

*“ Section III.—Duties.*

“ The following shall be the duties of the Inspector of Nuisances in respect of the district for which he is appointed ; or if he shall be appointed for more than one district, then in respect of each of such districts :—

“ (1) He shall perform, either under the special directions of the Sanitary Authority or (so far as authorised by the Sanitary Authority) under the directions of the Medical Officer of Health, or in cases where no such directions are required, without such directions, all the duties specially imposed upon an Inspector of Nuisances by the Sanitary Acts, or by the orders of the Local Government Board.

“ (2) He shall attend all meetings of the Sanitary Authority when so required.

“ (3) He shall by inspection of the district, both systematically at certain periods and at intervals as occasion may require, keep himself informed in respect of the nuisances existing therein that require abatement under the Sanitary Acts.

“ (4) On receiving notice of the existence of any nuisance within the district, or of the breach of any bye-laws or regulations made by the Sanitary Authority for the suppression of nuisances, he shall, as early as practicable, visit the spot, and enquire into such alleged nuisance or breach of bye-laws or regulations.

“ (5) He shall report to the Sanitary Authority any noxious or offensive businesses, trades, or manufactories established within the district, and the breach or non-observance of any bye-laws or regulations made in respect of the same.

“(6) He shall report to the Sanitary Authority any damage done to any works of water supply, or other works belonging to them, and also any case of wilful or negligent waste of water supplied by them, or any fouling by gas, filth, or otherwise, of water used for domestic purposes.

“(7) He shall from time to time, and forthwith upon complaint, visit and inspect the shops and places kept or used for the sale of butchers' meat, poultry, fish, fruit, vegetables, corn, bread, or flour, or as a slaughter-house, and examine any animal, carcass, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, or flour which may be therein; and in case any such article appear to him to be intended for the food of man, and to be unfit for such food, he shall cause the same to be seized, and take such other proceedings as may be necessary in order to have the same dealt with by a justice: Provided that, in any case of doubt arising under this clause, he shall report the matter to the Medical Officer of Health, with the view of obtaining his advice thereon.

“(8) He shall, when and as directed by the Sanitary Authority, procure and submit samples of food or drink and drugs suspected to be adulterated to be analysed by the analyst appointed under the Adulteration of Food Act, 1872, and upon receiving a certificate stating that the articles of food or drink or drugs are adulterated cause a complaint to be made, and take the other proceedings prescribed by that Act.

“(9) He shall give immediate notice to the Medical Officer of Health of the occurrence within his district of any contagious, infectious, or epidemic disease of a dangerous character; and whenever it appears to him that the interven-

tion of such officer is necessary in consequence of the existence of any nuisance injurious to health, or of any overcrowding in a house, he shall forthwith inform the medical officer thereof.

“(10) He shall, subject in all respects to the directions of the Sanitary Authority, attend to the instructions of the medical officer of health with respect to any measures which can be lawfully taken by him under the Sanitary Acts for preventing the spread of any contagious, infectious, or epidemic disease of a dangerous character.

“(11) He shall enter from day to day, in a book to be provided by the Sanitary Authority, particulars of his inspections and of the action taken by him in the execution of his duties. He shall also keep a book or books, to be provided by the Sanitary Authority, so arranged as to form, as far as possible, a continuous record of the sanitary condition of each of the premises in respect of which any action has been taken under the Sanitary Acts, and shall keep any other systematic records that the Sanitary Authority may require.

“(12) He shall at all reasonable times, when applied to by the Medical Officer of Health, produce to him his books, or any of them, and render to him such information as he may be able to furnish with respect to any matter to which the duties of Inspector of Nuisances relate.

“(13) He shall, if directed by the Sanitary Authority to do so, superintend and see to the due execution of all works which may be undertaken under their direction for the suppression or removal of nuisances within the district.

“(14) In matters not specifically provided for in this Order, he shall observe and execute all the lawful orders and



directions of the Sanitary Authority, and the orders of the Local Government Board which may be hereafter issued, applicable to his office.

*Section IV.—Remuneration.*

“ Article 1.—The Sanitary Authority or Authorities, as the case may be, shall pay to any officer appointed under this order such salary or remuneration as may be approved by the Local Government Board ; and where such officer is appointed for two or more districts, the salary shall be apportioned amongst the districts in such manner as the said Board shall approve : Provided that the Sanitary Authority or Authorities, with the approval of the Local Government Board, may pay to any such officer a reasonable compensation on account of extraordinary services, or other unforeseen circumstance connected with his duties or the necessities of the district or districts for which he is appointed.

“ Article 2.—The salary or remuneration of every such officer shall be payable up to the day on which he ceases to hold the office, and no longer, subject to any deduction which the Sanitary Authority or Authorities may be entitled to make in respect of Section II, Article 3 ; and in case he shall die whilst holding such office, the proportion of salary (if any) remaining unpaid at his death shall be paid to his personal representatives.

“ Article 3.—The salary or remuneration assigned to such officer shall be payable quarterly, according to the usual feast days in the year, namely—Lady Day, Midsummer Day, Michaelmas Day, and Christmas Day ; but the Sanitary Authority or Authorities may pay to him at the expiration of every calendar month such proportion as they may think

fit on account of the salary or remuneration to which he may become entitled at the termination of the quarter.

“ Given under our seal of office this 11th day of November, in the year 1872.

“ JAMES STANSFELD,

“ President.

“ JOHN LAMBERT, Secretary.”

In dealing with the various subjects enumerated in the contents, I shall avoid as much as possible repeating the Act. It must also be borne in mind that the subjects bearing upon the duties of the Sanitary Inspector are so numerous and of so much importance, that to thoroughly exhaust each one it would enlarge the book to an enormous size, and very much increase the expense of the same. It is, therefore, advisable to introduce such matter only as is of the most pressing importance.

First-class works are published on some of the subjects separately, to which for further information the reader is respectfully referred.

## CHAPTER II.

## METHODS OF INSPECTION.

ON entering upon a new district the Inspector should procure a map, with the boundary line of his district marked distinctly upon it, so that he may at a glance see the shape of the whole district. By doing this at the outset, his mind will gradually become familiarised with the configuration of the neighbourhood, and consequently much assistance will be derived.

It is usually convenient to commence duty at nine a.m. each morning, and from that hour until ten a.m. to wait in the office to meet persons who will occasionally be requiring to see the Inspector for information. During that hour he may attend to the correspondence, give out instructions to his clerks and assistants as to any special work he may have for them during the day. At ten o'clock he may then proceed into his district, and make any special inspection of premises, about which he may have received complaint, or proceed with any other general inspection he may have in hand; such general inspections to be proceeded with at all times when other duties are not requiring his attention.

He is recommended when making his inspections to go about them in a quiet, inoffensive manner, avoiding all

appearance of intrusion into private matters, and give the occupiers of the premises the least possible annoyance ; by so doing he will make friends instead of enemies, and receive little pieces of information, which he would otherwise fail to get, and which will prove of great assistance to him.

Generally it will be found requisite to visit the slaughterhouses every week, on the killing day (Thursday in most places), and call in when least expected on other occasions. The bakehouses, schools, and workshops once in three months, will be found to suit the requirements of the Acts, the periods at which to make the general inspections of each ward, or section, must entirely depend upon local circumstances.

During the last few years, the public mind has been aroused upon the subject of the better regulation of cowsheds and dairies, and not unjustly so, considering the great importance of our milk supplies being preserved from all sources of contamination.

The Inspector, when making his monthly inspections of cowsheds and dairies, will do well to have the following recommendations carried out as far as practicable :—

Every cowshed to be properly lighted and ventilated with lowered windows, the inner walls, doors, and woodwork to be covered with hard, smooth, impervious material, to the height of five feet from the floor. The trough manger to be of impervious material, and sloped to allow of being easily cleansed. A properly covered place for the reception of dung must be provided. No privy, cesspool, or urinal shall be within, or communicate directly with, a cowshed, and no inhabited room shall, on any pretext, be situated over it. The space for each cow to be not less than 800 cubic feet.

While on the subject of cowsheds, the following letter will be found both interesting and valuable to the Inspector. The letter was sent to Joseph Ansell, Esq., Clerk to the Aston Local Board (who kindly gave me his consent to my making this use of it):—

“LOCAL GOVERNMENT BOARD,

“WHITEHALL, S.W.,

“10th March, 1877.

“SIR,

“I am directed by the Local Government Board to advert to your letter of the 19th ultimo, with which you forwarded a memorial from the Local Board for the district of Aston, praying that a parliamentary measure might be promoted for the purpose of enabling sanitary authorities to exercise a control over cowsheds and dairies.

“It appears to the Board, from the first paragraph of the memorial, that the matters as to which the Local Board are advised, that they have no power, under the Public Health Act, 1875, to make regulations, are as follows:—

- “1.—The providing for the cleanliness of the animals;
- 2.—The cleanly and healthy storage of milk and dairy produce; and
- 3.—The prevention of nuisances arising from the keeping of cows.

“The providing for the cleanliness of animals, and the prevention of nuisances arising from the keeping of cows, are purposes so far similar, that they may be regarded as one—namely: the prevention of nuisances arising from the keeping of cows.

“The Board desire to point out that in their opinion the Local Board already possess ample powers under the Public Health Act, 1875, for this purpose.

“Under Section 44 they are authorised to make bye-laws for ‘the prevention of the keeping of animals on any premises so as to be injurious to health.’

“Further, under Sections 49 and 50, there are ample means of securing the removal from the cowsheds of any undue accumulation of dung, &c., from which nuisance may be anticipated. Again, on reference to Section 91, it will be (1) That any premises in such a state as to be a nuisance or injurious to health; (3) Any animal so kept as to be a nuisance or injurious to health; and (4) Any accumulation or deposit which is a nuisance or injurious to health, shall be deemed to be nuisances, liable to be dealt with summarily in the manner provided by the Act.

“The Board think that it is hardly necessary to point out that, for the abatement of such nuisances, extensive powers are confirmed by the Act.

“The regulations which the Local Board wish to make for ‘the cleanly and healthy storage of milk and dairy produce’ would doubtless have for their chief object the prevention of the spread of disease by infected milk. Although for this purpose fresh legislation may perhaps be requisite, it may be questioned whether in many cases the provisions of Sections 116—119 of the Public Health Act are not quite sufficient to prevent the exposure for sale, or the use for the

food of man, of any milk 'diseased, or unsound, or unwholesome, or unfit for the food of man.'

"I am, Sir,

"Your obedient Servant,

"DANBY P. FRY,

"Assistant Secretary.

"To JOSEPH ANSELL, Esq.,

"Clerk to the Aston Local Board,

"42, Temple Street,

"Birmingham."

At the slaughter-house my fellow-officer must make himself a frequent visitor, make the work as agreeable as you can under the circumstances, remembering always to do your duty firmly. Make a rule to visit your slaughter-houses every killing day, and on other days, when your work will permit. The Inspector will be greatly relieved in his work where public slaughter-houses are erected; a very useful piece of work will be performed, if, when slaughter-house licenses are applied for, the Inspector will make a minute examination of each of the premises, and advise his committee to refuse all applications where the ventilation, drainage, paving, water supply, &c., are not properly carried out.

The following form will be found useful for all applications for licenses to made upon:—

APPLICATION FOR SLAUGHTER-HOUSE LICENSE.

I, .....of.....  
do hereby apply to you to license, or to receive the license of,

the premises undermentioned, situated within your district, to be used by me as a slaughter-house for the slaughtering of cattle or other animals for human food, and I hereby declare that the following particulars in regard to the said house, for which I apply for such license, to be true to the best of my knowledge and belief.

- 1.—Situation of premises .....
- 2.—Name and address of owner .....
- 3.—The tenure on which the premises are held by the applicant. (If leasehold state for what period the lease is unexpired.).....
- 4.—Description of premises.
  - (a) Superficial area under cover ..... feet.
  - (b) Height of walls.....
  - (c) Height of roof or ceiling .....
  - (d) State whether there are any, and if so how many, rooms over the premises, and how they are used or occupied .....
  - (e) If a yard is attached to the premises, superficial area of such yard.....feet.
- 5.—Number of pens or stalls for cattle to be kept on the premises previous to being slaughtered .....
- 6.—Number of cattle or other animals for which accommodation is provided on the premises .....



- (a) Oxen .....
- (b) Calves .....
- (c) Sheep or Lambs .....
- (d) Swine.....

7.—State how the premises are supplied with water.....

8.—Number of water troughs on the premises for the supply of water to cattle .....

9.—State whether the premises and yards are paved or flagged .....

10.—State whether the means of drainage is sufficient...

11.—State how the premises under cover are ventilated...

12.—State what provision is made for the removal of blood and offal, &c., from the premises.....

13.—State the largest number of cattle or other animals which it is intended to slaughter weekly on the premises.

- (a) Oxen .....
- (b) Calves .....
- (c) Sheep or Lambs .....
- (d) Swine .....

*Dated this.....day of .....187*

..... *Signature of Applicant.*

..... *Address.*

The inspection of markets should be made mostly on market days, and, when time permits, daily inspections should be made. So much work is there in this depart-

---

ment that in moderate-sized towns special Inspectors are appointed for the markets.

The visiting of over-crowded dwelling houses must be done during the day as occasion requires, excepting when legal proceedings are to be commenced, when a visit must be made during the night, after the inmates have retired to bed. By this procedure the Inspector is enabled to prove the exact number of persons sleeping in the house. On these occasions he should have an assistant with him, so that the evidence of each may, if required, be placed before the magistrates.

## CHAPTER III.

## NUISANCES FROM SMOKE.

A GREAT number of nuisances arising from smoke still exist. The subject has been a most difficult one, but is now becoming more under control than hitherto. As to what constitutes a nuisance arising from smoke is, we presume, the amount of black smoke issuing from a chimney (not being the chimney of a private dwelling house) in certain quantities, and at the rate of so many minutes per hour. In practice, proceedings are taken against proprietors where black smoke is found issuing from the chimney for more than ten minutes per hour.

In going carefully through the Public Health Act, 1875, it is quite evident that nuisances from smoke and offensive trades have received special consideration in the framing of the Act. The Inspector will therefore require to exercise great care in putting the provisions of the Act into operation.

Nuisances from offensive trades will depend upon the amount of the injurious and offensive gases given off, and the position of the works complained of in relation to the nearest dwelling-houses.

The following are the trades mentioned in the 112th section of the Act:—

- Blood boiler,
- Bone boiler,
- Fellmonger,
- Soap boiler,
- Tallow melter,
- Tripe boiler, or
- Any other noxious or offensive trade, business, or manufacture.

This list does not, of course, include the whole of the trades with which the Inspector will be called upon to interfere. It will, however, in all cases where in his opinion a nuisance exists caused by the carrying on of an offensive trade, be his duty to report the same to his Committee, for them to give such instructions as they may deem requisite to meet the case.

Nuisances from smoke. While upon this subject it is advisable to glance at it briefly in a thoroughly practical manner, first considering how the smoke is formed, and then as to the best methods for preventing its formation.

The composition of common coal varies, but may be taken to be generally as follows:—Carbon, hydrogen, oxygen, and a small portion of nitrogen, and also a portion of earthy and saline matters.

One hundred pounds of coal is said to contain—

- 4·4 lbs. of hydrogen,
- 24 „ volatile carbon,
- 58 „ fixed carbon,
- 2 „ sulphur.

The perfect combustion of 100 lbs. of coal would evaporate, say, 1,200 lbs. of water. To do this, it is asserted that 746 lbs. of atmospheric air is required to be introduced into the furnace.

When coal is placed in the furnace, and commences to burn, it may be considered to be in a state of active decomposition, and, like other matter of vegetable origin or nature, gives off during this decomposition certain injurious gases, also gases not injurious, which are as follows :

Nitrogen gas ;

Carbonic acid gas (or carbon as smoke) ;

Water, in the form of steam ;

Sulphurous acid gas ;

Sulphite of ammonia.

The one to which we must direct our attention is the carbonic acid gas, on account of its quantity as compared with the others, and its injurious effects upon health. It is asserted that air containing 7 per cent. of carbonic acid gas is destructive to animal life. It is a very heavy gas, and the one known as choke damp to miners. It is not inflammable, and therefore great difficulty is experienced in consuming or destroying it.

During the process of combustion the hydrogen, which is a combustible gas, is readily consumed, but, if not sufficiently supplied with oxygen, passes off in its gaseous form.

It may be here remarked that the Public Health Act refers to the smoke more particularly—that is the carbon, or soot.

Anticipating, we may assume that the danger arising from the carbonic acid gas will be greatly reduced by the diffusion of gases, and if a nuisance injurious to health arising from the combustion of coal in the form of carbonic acid gas (although the smoke was consumed) was proved to exist, proceedings might be taken under the head of an offensive trade.

A nuisance of this description will be rare, being prevented by the beautiful law of the diffusion of gases just referred to.

Returning, then, to the process of the combustion of coal, we find that an insufficient supply of air causes the carbon to pass into the chimney in the form of soot or smoke, whereas with a sufficient supply of air it forms carbonic acid gas.

Whether carbon as smoke, or carbonic acid gas, is the most injurious to health, is a question for abler men than myself to decide. It is, however, apparent that we must accept one or the other, or portions of each.

Our duty under the Act appears to be to have the smoke prevented. It is, therefore, of the utmost importance for the Inspector to become acquainted with the principles of smoke preventing, so that he may (although not specially called upon by the Act so to do) give information to tradesmen who are anxious to carry out the requirements of the law, but who are often wandering about among the many patents like a child in a fog, not knowing which to adopt.

When speaking of smoke consuming, we must bear in mind that it is really smoke preventing that requires

our attention. That smoke can be prevented there is no denying the fact. In carrying this into effect there are two objects to attain:—1st, to regulate the supply of oxygen to the requirements of the combustion going on inside the furnace, bearing in mind that too little allows the carbon to go up the chimney in the form of soot and smoke, and that too much oxygen reduces the temperature so low as to cause the gases to pass up the chimney without becoming ignited, and thus causing smoke; 2nd, to make provision by which the gases may be subjected to a high temperature, and for such a length of time as to ensure their ignition, and thus cause the carbon to become carbonic acid gas instead of assuming the form of smoke.

As to the best methods of preventing smoke, we must first take into account the supply of oxygen, which is a most essential feature. For every 100 lbs. of coal there should be passed into the furnace 178 lbs. of oxygen, which will of course require 740 lbs. of atmospheric air. The mode of supplying this oxygen is also a matter of importance, inasmuch as to have fixed openings in the door for the admission of air in sufficient quantities would be a great waste of fuel, as the cold air would, after the smoke was consumed, reduce the heating power without attaining any object essential. For the purpose of obviating this waste of heating power several patents have been brought out. For the purpose of explanation, I will make reference to the one known as "Broadbent's Self-acting Smoke Preventer and Fuel Economiser," which is an automatic apparatus fixed to the boiler front, by which certain openings are opened and shut as the oxygen is required, which is done by the opening and shutting of louvres.

One of the peculiarities of these louvres is in the arrangements of the laths, which are so mounted upon their pivots that upon being drawn back to their full extent, which takes place upon the closing of the doors, they only admit one-half the quantity of air of which they are capable, but upon the gradual falling of the weight the louvres open to their full extent. A continuation of the same motion, however, eventually closes them, in which position they remain until the door is again opened.

The admission of air in the above proportions coincides, as nearly as possible, with the requirements of perfect combustion. It is much more effectual, and certainly more economical, than the usual plan of admitting the full quantity on first charging the furnace, when it is not required, and having a deficient supply when it is most needed.

Mr. Broadbent's apparatus is undoubtedly a good one, and well devised to attain the object aimed at.

There is, however, another object to be gained in conjunction with the preceding one: that is, as before stated, to subject the gases evolved during combustion to an high temperature, and for such a time as to ensure their ignition, without which, it must be remembered, the gases go up the chimney in the form of smoke. I may here remark that if the reader will observe for himself, he will generally find those chimneys smoke most where the furnace and chimney are close to each other, without any length of flue, which is accounted for in this way, that so soon as the gases are evolved from the coal they are hurried up the chimney, whereas in a large or long flue the gases have to travel for



some time through what might be termed a hot oven, thus subjecting the gases to a high temperature for a considerable time, and thereby ensuring their ignition.

Where it is found the flue is too small or too short, a hot air chamber, or oven, should be constructed between the furnace and the chimney, with its inlet and outlet so arranged as to detain the gases for a short time in their passage to the chimney.

If the principles here recommended are properly carried out, I am confident that the smoke will be so far prevented that no nuisance will arise, and that no legal proceedings could be sustained against the owner of a furnace.

## CHAPTER IV.

## \* UNSOUND FOOD.

THE detection of diseased and unsound meat and food is one of the most important and sometimes difficult duties that the Inspector is called upon to perform. He must, therefore, make minute and close observations in all cases which come before him in his earlier experience, so that, with a little practice, he will have full confidence in himself when called upon to give his decision, which will often occur in large towns.

Decomposed meat or food will come under the term unsound or unwholesome, and may generally be detected by the smell. The Inspector in these cases will be guided by the stage of decomposition at which the article has arrived, and is recommended not to attempt to draw the line too fine, unless supported by the opinion of the medical officer.

With diseased meat the case is somewhat different; if he is in a position to prove that the carcass is that of a diseased animal the case may be considered clear, inasmuch, as the section of the Act, 117, cap. 55, is definite upon the point as to diseased meat being condemned. I may, however, remark that at the hearing of diseased meat cases before Magistrates, the stage at which the disease has arrived, and

also the nature of the disease, are considered as important items in judging the case ; how far the Magistrates are correct in so doing, I am not prepared to state. This much may however be said, that with a case with sufficient proof of a diseased carcase of meat the Inspector is perfectly justified in taking the opinion of the Magistrates upon it, and let them decide upon the merits of the case.

As to the modes of detecting diseased meat, the following remarks will be found useful :—

1st. Bad meat never or very rarely sets or stiffens properly. This is an excellent guide ; but, of course, open to certain objections.

2nd. Bad meat is generally wet, in fact, often completely soddened with water, especially when caused by dropsy.

3rd. The fat in bad meat will be found of a flabby nature, instead of being crisp, dry, and firm.

The colour in certain cases may be a guide, but I decline to go into that for fear of confusing the inexperienced, considering the variety of causes which produce slight alteration of colour.

It will answer the convenience of the Inspector and the ends of justice will be better met if he will contrive to make his seizures before the carcase leaves the slaughterhouse ; by this method he will avail himself of certain advantages which are to be gained in seeing the meat in carcase preferable to seeing it in joints. There will, of course, at times, cases arise where the diseased meat will never enter the slaughterhouse, but will, during the night come direct from the farm

where death has relieved the suffering animal from some lingering disease. There are only a certain class of butchers who venture in this dangerous traffic, who may be selected out if the Inspector makes himself a regular attender at the cattle markets.

In this work, and this alone, will the Inspector (of a moderate-sized borough) be able to give the ratepayers of his district full value for the money he receives in salary, if he succeeds in putting an entire stop to the sale of the diseased rubbish, which is sold in some districts.

I now propose to direct the attention of the reader to two letters which I received respecting a bad meat case in my experience, which will be found to be of great value, coming as they do from so high an authority, each of the gentlemen having kindly given me their consent to my making this use of them.

PROFESSOR WILLIAMS' LETTER.

“Veterinary College, Edinburgh, 17th Nov., 1876.

“MR. ROBINSON, INSPECTOR, CARLISLE.

“Sir,—Agreeably with your request, I examined a carcase of beef at the shambles, Carlisle, and found that the animal had been slaughtered whilst suffering from tuberculosis.

“Whilst I am of opinion that mere tubercular growths or ‘grapes’ do not, if carefully removed, render the meat unfit for food, provided such meat presents a healthy, firm appearance; on the other hand, if the meat be flabby and the fat of the areolar tissue removed and replaced by a watery

material, it (the meat) is unfit for human food. This was to some extent the condition of the carcase in question.

“ It may be stated that the red flesh, or muscular tissue, had a fair appearance, and was in some parts moderately firm to the touch ; whilst in other parts, such as the breast and belly (the defendant parts of the body), it was pale in appearance, dropsical and flabby to the touch.

“ In consequence of part of the body being moderately healthy, it is possible that there might be difference of opinion as to whether the carcase should be condemned or not ; however, after carefully weighing the matter, I am of opinion that the meat is unfit for human food.

“ Yours, truly,

“ W. WILLIAMS, P.R.S.S., PROFESSOR.”

DR. YOUNG'S LETTER.

“ Veterinary College, Edinburgh, Nov. 24th, 1876.

“ Dear Sir,—At Professor Williams' request, I give you a short sketch of the evidence I would be prepared to give with regard to the cow which is the subject of dispute. I examined a growth said to have been cut out of the chest of the cow, and found scattered through it masses of tubercle, varying in size from a pin's head to a walnut. These tubercular deposits were old, as shown by their yellow colour and the large growth by the calcareous matter in their interior. The tissue in which the masses were embedded was soft and pulpy, and, on microscopical examination, was found to be infiltrated with lymphous corpuscles. The condition shows that around the old tubercular masses, that new and active cell growths had arisen which I have no hesitation in saying

would be attended with a general deterioration of the condition of the animal. This deterioration consisting in absorption and wasting of the tissue, more particularly the fatty and muscular tissue, so that the flesh would become pale, flabby, and watery, and unfit for human food. If you think the above evidence would be of any use, please let me know per telegram, as I would require to leave here on Sunday evening to be back again on the following evening.

“ I am, yours, sincerely,

“ PETER YOUNG, M.D.”

The first step the Inspector must take on making a seizure of bad meat or other unsound food, will be to thoroughly satisfy himself as to its being unfit for food, by calling in such evidence along with the Medical Officer of Health, as the case may require. Having made the seizure, have it carefully stored in safe custody, that is, in your bad meat depôt. Next proceed to call in a Magistrate to grant you an order for its destruction, intimating to the owner of the meat your intention to make such application for an order to destroy.

After obtaining the order, give the owner further intimation that you are going to put the order into execution, by destroying the meat or other article ; and also give him reasonable opportunity to have it examined by competent persons, whom he may require to call as witnesses.

## CHAPTER V.

## COLLECTION AND DISPOSAL OF NIGHT-SOIL.

It does not always happen that Sanitary Inspectors have the superintendence of this department, but, when convenient, it is very essential that the Inspector should have the entire control of this work. The removal of night-soil and ashes is beset with many difficulties, which I propose to make a few observations upon, and assist, if possible, my fellow Inspectors in their efforts to deal with this vexatious subject. The cost of this work varies according to local circumstances as to opportunities for disposal, cost of carting, &c. With a view of bringing under the eye of the Inspector the variation in cost, and also the average cost, which will materially assist him in making out estimates for new districts, I have appended the following table, the figures for which are extracted from the Local Government Board Report on sewage disposal.

## REMOVAL OF NIGHT-SOIL AND ASHES.

## I.

Table showing relative Cost of Removal of Night-soil and Ashes. The various towns given below are those taken

from the "Report on Sewage Disposal" (c. 1410), published in 1876 by the Local Government Board.

Town.	Population.	Cost of Removal after Deducting Sales.	Cost per Head of the Population.		
		£	£	s.	d.
Cheltenham ...	45,000	324	0	0	1 $\frac{3}{4}$
Doncaster ...	20,000	229	0	0	2 $\frac{1}{2}$
Carlisle ...	35,000	800	0	0	5 $\frac{1}{2}$
West Derby ...	31,000	700	0	0	5 $\frac{1}{2}$
Bolton-le-Moors...	93,000	2,151	0	0	5 $\frac{1}{2}$
Coventry...	40,000	940	0	0	5 $\frac{3}{4}$
Wolverhampton...	71,000	1,600	0	0	6
Chorley ...	20,000	523	0	0	6 $\frac{1}{4}$
Leamington ...	24,700	780	0	0	7 $\frac{1}{2}$
Blackburn ...	90,000	3,835	0	0	10 $\frac{1}{4}$
Halifax ...	68,000	2,996	0	0	10 $\frac{3}{4}$
Bradford ...	173,723	8,288	0	0	11 $\frac{1}{2}$
Leeds ...	285,000	18,000	0	1	2 $\frac{3}{4}$
Birmingham ...	350,000	29,295	0	1	8
Rochdale...	67,000	7,024	0	2	1 $\frac{1}{4}$

Average cost per head of population of the 15 towns. 9 $\frac{1}{2}$ d.

For the purpose of dealing with this subject more in detail, we will divide it into two sections, namely, night-soil collection and disposal.

*Collection.*—In urban districts the collection of night-soil is generally regulated by local bye-laws, which prescribe certain hours for such removal to be effected, for instance, between 11 o'clock at night and 8 o'clock in the morning.

In all cases where the Inspector has the management of a night-soil department, he should by all means have the



appointment of all the men under his charge, inasmuch as there are so many difficulties surrounding the work, and that unless he has the men under proper control the work will neither be done efficiently nor economically.

The collection of night-soil by what is known as the "street row or rotation plan," was first introduced many years ago by my respected friend and tutor, John Newhouse, Esq., Chief Sanitary Inspector for the Borough of Leeds. When this plan was introduced I was then Assistant-Inspector to the gentleman just named, and so satisfied did I feel as to the superiority of this plan that when I was afterwards appointed Sanitary Inspector for the City of Carlisle, on the first opportunity I introduced the system there; and for the purpose of giving the reader some positive proof as to the superiority of this method, I have introduced below table of cost for Carlisle, which shows a gradual annual rise in the expenditure for the removal of night-soil up to the year 1876, when it suddenly fell some £450, this being the first year I had this plan carried out in Carlisle.

If the reader will kindly turn to table c. 1410, he will find that the average cost per head of population per annum for the fifteen towns named is  $9\frac{1}{2}$ d., whereas for Carlisle it is  $5\frac{1}{2}$ d.

## II.

Table showing the yearly cost (under the head of Sewerage Expenses), of which the principal portion is cost of removing of Night-soil and Ashes since 1873, when the Town Council commenced the removal,

CARLISLE.

Year.					
			£	s.	d.
1873	...	...	370	13	5—Old plan.
1874	...	...	725	7	2— „ „
1875	...	...	964	17	11— „ „
1876	...	...	1,524	4	2— „ „
1877	...	...	1,067	0	0—First full year of new plan.

J. ROBINSON,

*Sanitary Inspector.*

TOWN HALL, CARLISLE,

*September 7, 1877.*

The principle of this system may be explained as follows :—It is to commence at one end of a street, and empty every ashpit in order as they come, completing street after street until you have got through your district ; then commence at the former starting point again.

In going into the details of this system more minutely, it will be found that there are some very serious obstacles in the way :—

1st. Irregularity in size of ashpits.

2nd. The work having to be done during the night, many yards get locked up, and the people are disinclined to get up to open them, and are also disinclined to leave them open for you, although expecting you coming to empty their ashpits.

As to the first objection, the best plan will be to get the very large old middens reduced in size and reconstructed on improved principles. Also, where it is found that too many tenants are using one ashpit, thus causing the ashpit to be

full long before the time of other ashpits in the district, the Inspector must serve notice upon the owner, requiring him to provide more ashpit accommodation.

As to the second objection, the following circular sent round during the day to the householders in the district where work is going to be carried on during the night, will be found to have a good effect :

NIGHT-SOIL DEPARTMENT.

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I beg to inform you that we intend (weather permitting) to empty the Ashpits in the neighbourhood of your house to-night commencing at eleven o'clock.

I have, therefore, to ask you to be kind enough to leave your back yard doors open before retiring for the night, and thus allow our men free access to the ashpit.

Yours truly,

A——— B———,

Inspector of Nuisances.

*Disposal of Night-soil and Ashes.*—Dry ashes, when not mixed with night-soil, may be disposed of in many ways, such as filling up low-lying marshy pasture land, such as is not intended for building purposes, making embankments for certain purposes, or grinding up into mortar with a given proportion of lime ; or, better still, to be submitted to what is known as “ Fryer’s Process.”

The following statement will be well worth careful study on the part of the Inspector :—

The system here described is now at work in Leeds, Manchester, and Birmingham. Mr. Alfred Fryer has undoubtedly made a great stride in modern sanitation.

“ ON THE DISPOSAL OF THE REFUSE OF TOWNS.

“ AN ADDRESS TO THE CORPORATION OF DERBY,

“ BY ALFRED FRYER.

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“ *Printed at the request of the Mayor, W. Higginbottom, Esq.*

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“ The disposal of the refuse of towns in a manner that will not imperil the health of the inhabitants, that shall not be revolting to the sense of decency, and that at the same time shall not impose upon the ratepayers a heavier burden than is needful, is a problem of great importance, and one which has engaged the attention of many eminent men.

“ It is not, however, to be expected that any one method will be of universal application. Towns conveniently situate for discharging their water-borne refuse into the sea, or into the lower reaches of a tidal river, are not likely to concern themselves with irrigation farms or precipitating tanks, whilst imagination can scarcely conceive anything more revolting than a similar discharge from towns situate near the source of rivers, so that the sewage must become mingled with the water used by the population inhabiting the lower part of the course.

“It may be convenient in considering this question, so far as it affects most inland towns, to subdivide the refuse into three classes :—

“1st. Refuse that **CANNOT** be removed by water transport.

“2nd. Refuse that **MUST** be removed by water transport.

“3rd. Refuse that **MAY** be removed by water transport.

“The group of substances which cannot be removed by water are obviously insoluble solids, and these may be classed into mineral and vegetable.

“The former consists mainly of the cinders and ashes from house fires, and, together with these, broken earthenware and glass, oyster and other shells, and small portions of iron and tin.

“Where the old-fashioned ashpits or middens exist, these substances are frequently either soaked or accompanied by water, and are offensive by the admixture of fœcal matter.

“Though these substances contain a portion of combustible material, they are blended with so much incombustible, they are so choked with dust, and so saturated with water, that instead of being capable of ready ignition they would quench any ordinary fire upon which they might be thrown.

“This material is very difficult of disposal. It possesses no value as manure; when piled in heaps it often becomes offensive; and, as the dust-bin is usually the receptacle of solid refuse, it contains the dust and rubbish swept from the rooms, not only of ordinary residences, but it may contain also the sweepings from sick rooms of small-pox and scarlet fever patients, and not unfrequently portions of clothing

which spread the germs of disease in the air. These are conveyed still more certainly to the homes of the poor creatures who often search the refuse to glean the perilous treasures. No wonder that zymotic disease starts out without any apparent cause in the lower parts of towns, where it can be conveyed to them as effectually as the plague was carried from London in some woollen clothing to your own martyr village of Eyam, 211 years ago.

“The method of placing such solid refuse upon tips has nothing to recommend it. The heap is both unsightly and dangerous. The evil is cumulative. Each generation has not alone to find space to dispose of its own refuse, but it must also tolerate the accumulations of those which preceded it. Continue the process long enough, and every town must stand within, if not upon, a belt of refuse; must tolerate the refuse before its doors, as the tenants of an Irish cabin do, or must imitate our pre-historic ancestors with their kitchen-middens.

“The Health Committee of Manchester, with the aid of their Medical Officer, Dr. Leigh, and of their energetic Superintendent, Mr. Whiley, have for some time demonstrated that ashes and clinkers when ground with hydrate of lime make a most excellent and tenacious mortar. They were, however, unable to deal with the refuse to which I have adverted. They could not burn it *en masse*, and if any of the material tainted with fœcal matter were used the mortar became offensive.

“To deal with this difficulty the patent Destructor was devised. The object aimed at was to obtain a furnace so

arranged that when once ignited the radiant heat generated should not be permitted to escape, but should be reflected upon the burning material, so as to intensify the combustion and raise the temperature as much as possible. This having been effected, the heated products of combustion should be passed over a further supply of material, which would thus become deprived of its water and be raised in temperature, ready for active combustion when its turn came to reach the furnace proper. Such then is the Destructor. The material treated is frequently indistinguishable from wet mud. Cart-loads of bricks, saturated with water or urine, bottles, glass, &c., are shot in these furnaces; they are made red hot; all water is evaporated, all organic matter is decomposed, all combustible matter is consumed, and the mineral matter alone is left, "purified as by fire." No smell is produced by the burning. Two-thirds of the mass disappear, and the residue—ash and clinker, fused glass and earthenware, offering sharp angular fractures—furnishes when ground with lime, a mortar for which there is abundant demand. There is no fear of being under-sold, for as one of the raw materials cost less than nothing, mortar-makers not possessing similar advantages may be working to a loss, while the makers of vitrified mortar will be reaping a profit.

"The Destructor requires but little attention. It is almost self-feeding. The material slips down the sloping bottom of of the furnace, and the clinkers are easily withdrawn at the furnace mouth.

"The Destructor furnaces are a series of cells. The cost of each cell for ironwork is about £80, to which the cost of brick-

work must be added. The royalty payable is less than the cost of placing the refuse in a cart, or wheeling it across the road. The heat generated by the Destructor furnishes power for grinding the mortar, and for other purposes, to be described later.

“ Each cell deals with 140 cwts. per day.

“ By this mode of treatment, the refuse is absolutely got rid of, without injury or annoyance to contemporaries or to posterity. No danger is to be apprehended from the spread of the disease. No accumulations remain, and that which was an incumbrance becomes a marketable commodity. It remains to be added, that at Manchester the difference between cost and sale price leaves to the Corporation a fair profit on the trade of mortar making.

“ Having disposed of the *mineral* solid refuse, let me invite your attention to the *vegetable* solid refuse. This consists of garbage, part of which is brought with the ashes, and part is found in the pails. It includes the sweepings of the markets, also straw, shavings, rags, sacks, and an endless assortment of minor articles. To destroy absolutely these things would be wasteful, as they constitute the raw materials out of which is made one of the most valuable substances for a Sanitary Committee. I allude to charcoal. A portion of the cinders before referred to as food for the Destructor presents the needful fuel. All that is required is a form of apparatus that shall, without much labour and without producing any offensive odour, convert the garbage into charcoal.

“ The Patent Carboniser effects this object. It consists of a rectangular chamber of considerable height, into the top



of which the material to be operated upon is thrown, and through which chamber it gradually descends as its bulk diminishes, and as the material below is removed. Finally, when sufficiently carbonised, it is withdrawn through a slide in the bottom of the chamber. This chamber is heated by a furnace placed at the side. The fire in the furnace is kept thick, and the supply of air to it small, so as to prevent the admission of sufficient oxygen for perfect combustion. Thus the products of combustion from it can only heat, and not remove the carbon, and they may therefore safely be brought into direct contact with the materials to be carbonised. These products of combustion enter the kiln, or carbonising chamber, near the bottom, and are guided around it by iron plates which touch the wall at their top edges, but slope so that their bottom edges are some distance from it. These are ranged round the chamber in a spiral form, and keep open a passage along which the products of combustion can always find a way to the chimney, while being open at the bottom, the gases can come into direct contact with the materials in the kiln. The plates becoming heated, also help to dry and carbonise the materials. Finally, the products of combustion are led away to the chimney through a flue near the top of the chamber.

“Condemned food, stale fruit, and vegetables are readily disposed of by the Carboniser. Sweepings of paved streets contain much vegetable matter, portions of hay and straw, horse droppings, &c. These are readily carbonised, and the charcoal thus produced, as well as that from the more exclusively vegetable matter before adverted to, is most valuable.

“First, as a DEODORANT. A small portion scattered over the most offensive materials actually destroys all trace of

odour. Its effect is almost magical. Where the pail system is used, a very small portion of charcoal discharged automatically, as in Moser's closets, or dusted over the contents, effectually destroys odour. Even if a bag of charcoal be emptied in a foul atmosphere, such as a place where nightsoil is mixed, the fine particles of charcoal floating in the air render it perfectly sweet. Charcoal is a needful commodity where the pail system is used.

“Second, as a DISINFECTANT. Mixed with a small proportion of crude carbolic acid, the charcoal may be presumed to be one of the most valuable and effective disinfectants known. The charcoal is well known to abolish offensive organic matters, and to destroy them by a peculiar power which it has of causing oxidation, but it cannot enter the atmosphere (except in the condition of dust). This permeation of the air is effected by the carbolic acid, and the combination is found to be very valuable. The Health Committee of Manchester make free use of this carbolised charcoal with excellent results.

“The advantage to be derived from placing a layer of charcoal over every coffin before closing a grave has been often pointed out, but the difficulty of obtaining at a moderate cost and in sufficient quantity a material that would ensure the salubrity of graveyards and cemetries, and that would prevent the offensive effluvium that sometimes emanates from re-opened graves, has prevented its use. Now that it is easy to secure an abundant supply at a trifling cost, this needful sanitary reform may be accomplished. Cremation of the vegetable refuse will not present the difficulties attendant

on the cremation of the human body, yet it will secure some of the advantages sought.

“Third, as a DECOLORANT. A portion of the contents of one of the Manchester sewers, mingled with water from the river Medlock, and fortified with the contents of two ink-stands, one containing writing and the other copying ink, and these further coloured by an infusion of logwood and a solution of indigo, made a fluid that was opaque in a half-inch test tube, and that would serve as writing ink. Passed through a filter composed of a small quantity of carbonised garbage, this filthy and black mixture became in appearance identical with spring water.

“Street sweeping ground with a portion of clay, and carbonised, produce a filtering medium of great power, and so little friable in its nature as to make an excellent filter bed and one which is in use at the present time by various dyers. This material forms the subject of one of the patents held by the Universal Sewage Co.

“Fourth, as an OXIDISER. A portion of the Birmingham sewage was subjected to filtration through a bed of charcoal produced by the carbonisation of sewage sludge. It became brilliant in appearance, and when subjected to analysis by order of the Mayor, it was found to contain far less ammonia and organic nitrogen than sewage which had passed through the land as a filtering bed. This promising mode of treating sewage with the charcoal derived from sewage sludge is too recent a discovery to have been practically applied.

“The Carboniser, like the Destructor, is composed of a series of cells, each of which can deal with 50 cwts. of garbage per day.

“ You have now been so good as to traverse with me the first of the three divisions of our subject, namely, the mode of dealing with the solid refuse, which we have converted into mortar and charcoal.

“ We will now consider the second division, namely, those portions of the refuse of towns that *must* be removed by the sewers. These may be conveniently grouped under three heads :—

“ (a). The involuntary supply to the sewers.

“ (b). The voluntary supply from dwelling-houses.

“ (c). The voluntary supply from other sources.

“ (a). The involuntary supply consists of rain water that finds its way into the sewers; of natural springs; and of leakage from the general water supply. These are the natural feeders of rivers; the former two would exist if the towns were absent, and the last is no source of contamination. So far, then, as these are concerned, there is little that even the fastidious may complain of.

“ (b). The voluntary supply from domestic sources consists of water used for washing and culinary purposes. As the impurities from these sources consist mainly of soap and fat and very little nitrogenous matter, it is evident that were the contents of sewers confined to these substances, a very moderate treatment would suffice to render the water fitted to enter streams.

“ (c). The voluntary supply from other sources includes the fluids discharged from mills and manufactories, also the discoloured water returned by dyers and bleachers. Some

small portion of these liquids is too foul to warrant its being turned direct into rivers, but a larger portion, which is merely dye water, can be readily deprived of its colour, as before shown; and the remainder, which consists of water from mills, is practically free from contamination, having been simply used for condensing the steam which drives the engines.

“ Thus, it appears that those liquids, which *must* of necessity find their way into sewers, do little to pollute them, and may be rendered comparatively pure by a moderate treatment.

“ We have now only left to consider the last of the three divisions into which we classed the refuse of towns, viz., those substances that *may* be water borne, but which also may be, if desired, excluded from the sewers. These obviously consist of the contents of water or other closets, and the drainings from public urinals, cesspools, and stables.

“ These nitrogenous compounds are all highly offensive.

“ They are the substances which generate poisonous sewer gases.

“ They are vehicles for the spread of cholera and typhoid fever.

“ They are the substances which pollute streams, and until the organic matter be decomposed they are dangerous to health. Even when the decomposition has been effected, and the nitrogen has associated itself with oxygen, and this with a base, so that it is found in the form of nitrates or nitrites, the mind still revolts at the introduction into potable water of this most offensive human refuse, even though decomposed.

“ Whilst sewers containing these offensive and dangerous matters are unfitted to be discharged into rivers, they are at least as objectionable to the inhabitants of the towns. Such sewers are contrivances for the elimination of sewer gases, and these readily find their way into dwelling-houses through imperfectly trapped drains. The mischief is not confined to these faulty arrangements; the poison will certainly find its way into houses through porous soil. Let me quote from a leading medical authority, viz., from an article by Sir Thomas Watson in a recent number of *The Nineteenth Century*:—

“ ‘ During the prevalence of enteric fever in a large town a vast quantity of the dejections peculiar to that disease must be daily and hourly poured into and through the drains and sewers, impregnating the sewer gases with the specific poison. In our present faulty arrangements these gases, so infected, enter many a house, the inmates of which are unsuspecting of such a source of fearful peril. Mr. Rawlinson, the well-known engineer, has stated in print that in the year 1859 disinfectants were freely used in some of the main sewers of London, and ‘ the smell of the disinfectants was found to pervade all the houses in the district connected by drains with these sewers, showing to demonstration that such houses must, at all other times, be pervaded with diluted sewer gases.’ Wherever (writes Dr. Budd) the alvine discharges from enteric fever patients travel — wherever exhalations from them penetrate — there the most specific of all the exuviae of the sick body are in operation. *The sewer, which is their common receptacle, is the direct continuation of the diseased intestine.* \* \* \* \*

“ ‘According to the Corporation return for 1874, there are in one part of Edinburgh, congregated together and inhabited by the lowest of the population, no less than 14,319 houses or dwellings, many under one roof, on the ‘flat’ system, in which there are no house-connections whatever with the street-sewers, and consequently no water-closets. To this day, therefore, all the excrementitious and other refuse of the inhabitants is collected in pails or pans, and remains in their midst—generally in a partitioned-off corner of the living room—until the next day, when it is taken down to the street and emptied into the Corporation carts. Drunken and vicious though the population be, herded together like sheep, and with the filth collected and kept for twenty-four hours in their very midst, it is a remarkable fact that enteric fever and diptheria, the two diseases that, in the words of Mr. Simon, are the direct emanations from ‘the filthiest of all filth,’ are simply unknown in these wretched hovels. Turning, however, to the fashionable or New Town, where the houses are provided with all the modern conveniences, and communicate with drains which the natural contour of the city ought to render most effective, with here and there a cesspool, we find that enteric fever and diptheria are never absent.’

“The death of Prince Albert at Windsor, and the alarming attack of enteric fever which the Prince of Wales contracted at Scarborough, show that those in the most exalted stations are not safe from the danger attendant on exposure to sewer gases.

“The modern system of dealing with sewers would be amusing were the subject not too serious for joke. In order

to conceal the sewage, and to escape its noxious effluvia, the offensive liquid is conveyed away in costly underground sewers; but as the production of sewer gases is not prevented thereby, and as these will force themselves into human dwellings if not suffered to escape elsewhere, ventilators are introduced into the sewers here and there *in order to ensure the discharge of the poison into the open air!*

“It should be remembered that those substances which are innocuous in sewers are valueless out of them, whilst those organic matters which are so objectionable in sewers and in rivers, possess a considerable value when isolated and concentrated.

“And it should not be forgotten that when soluble organic matter is once mingled with much water the nitrogen cannot be extracted by any method of precipitation, and even when applied to land on irrigation farms only a portion is removed.

“Unless, then, there should exist some great difficulty, practical or financial, it would seem to be a self-evident proposition that “the best or simplest method to *make* sewers innocuous is to *keep* them innocuous.” This leads us to the pail system. Even where this method is adopted without the improvements which experience has suggested, it presents a natural, sensible, simple, and effective mode of removing the offensive material. The improvements referred to are:—  
1st, that the pails should be thoroughly cleansed and purified before being replaced. 2nd, that each closet should be supplied with a little charcoal, whereby all odour is destroyed. 3rd, that the pails should be changed frequently. 4th, that the pails should be carried away in a closed van of



wrought iron, that should be absolutely steam-tight, or rather, odour-tight. The importance of this will be appreciated by those who have stood in the wake of one of the ordinary vans. The pails may be closed with rubber-packed lids, which are supposed to be tight; but so long as here and there a pail leaks there is a trickling of offensive matter along the streets, and a waft of sickening odour marks the track of the van. Yet it is as easy, with proper appliances, to restrain the odour within the van as the scent within a vinaigrette, or the ammonia within a bottle of smelling salts. Such a van, possessing also minor advantages, which I will not trouble you with, has been patented. We see, then, how the closets can be preserved sweet, and how the material can be transported to the *depôt* without a trace of nuisance. Let me here introduce a paradox. The dirtier the process, the greater the cleanliness needed. Not only should vans and harness be kept clean, but the men employed should be clean in their persons and dress also. Each man might wear a glazed hat, and have daily supplied to him a clean canvas jacket, and a dark but clean apron to protect his trousers. Having taken the *foecal* matter to the *depôt*, the mode of disposal of it must now be considered. Human urine is well known to be the most valuable manure existing, but this valuable material is diluted with thirty times its weight of water. The removal of this water is the object sought, and the difficulties are so great as to have been considered by Mr. Rawlinson and others insuperable.

“The odour from highly-heated urine is most offensive. Heat decomposes urea and drives off ammonia, and this valuable alkali is volatile at very low temperatures.

“Yet the problem has been solved. No offensive odour whatever, and not even the faintest odour of fœcal matter or of urine escape during the operation. Not a particle of ammonia is lost. The apparatus is not an untried one, but has been largely used during the last ten years for the concentration of cane juice. The process requires no chemicals and no skilled attendance.

“The concentration is effected in the Concretor.

“By this means nearly all the water is removed, and the already existing ammonia is fixed by the sulphurous acid in the hot gases from the Destructor. As the process is simple and the heat is furnished, as it were, gratis, it is not wonderful that the concentration is effected economically.

“This apparatus consists of a revolving cylinder, 8 feet long and 4 feet 6 inches in diameter, having its ends partially closed by annular rings, and fitted inside with scroll-like plates of thin metal. The liquid is admitted into this cylinder, and as it revolves these scroll-like surfaces become wetted; the evaporation is effected by passing heated gases through the cylinder. As these come into contact with the wetted surfaces of the metal scrolls, rapid surface evaporation takes place, the temperature of the liquid undergoing concentration remaining low—so low that when discharged from the cylinder at about the consistency of treacle, it is rarely, if ever, at so high a temperature as 130° Fahr. The hot gases used for effecting evaporation in the Concretor, result from the combustion of refuse material in the Destructor.

“The fluid and semi-solid contents of the pails having been deprived of nearly the whole of their water, by means

of the Concretor, may either be desicated into *poudrette*, or be mixed with a portion of charcoal, in order to make a friable, odourless manure. These manures, being extremely rich and concentrated, are of high intrinsic value, more nearly resembling guano than any other manure in the market.

“The Ancients considered Fire, Air, Earth, and Water as elements. We will regard them as the vehicles for the removal of the refuse of towns.

“The Water-closet system exemplifies the use of *Water*; and as it involves the generation and liberation of sewer gases, it also illustrates the use, or rather the misuse, of *Air*. The purity of streams is held to be of great importance. Yet the whole of the water (save the little lost by spontaneous evaporation) used to transport the offensive matter is—except in the case of towns situated near the sea coast—compelled, sooner or later, to enter the streams. The filth in suspension may be first removed, or it may not; the nitrogen in solution may not be removed, or it may be removed in part; *but it is in practice never removed* entirely.

“The methods now advocated are the employment of *Fire* and *Earth*. Solid mineral refuse is purified and reduced by *Fire*. It is converted from a valueless material into a valuable one, and it is sold as mortar. By *Fire* the solid vegetable refuse becomes valuable charcoal; from being a generator of offensive odour it becomes a destroyer of such odour. By *Fire* the organic liquids become valuable solids, and this *Fire* is furnished by the very refuse itself. The concentrated manure is so valuable that it will bear the cost of transport to great distances, where at last it finds its fitting home in the *Earth*.

“The apparatus for treating refuse in the manner described is made by Messrs. Manlove, Alliott, and Co., Engineers, Nottingham and Rouen.

“This method, although new, has early attracted notice. It may be seen in operation at the works of the Manchester Corporation, and Birmingham is adopting the system in the most complete manner, with the view of extending it, if successful, to the whole of that most extensive borough. Leeds, too, has decided to adopt as much of the system as is applicable to its present wants. When places of such magnitude and importance as Manchester, Birmingham, and Leeds have, after careful inquiry and examination, adopted the system, it will not be considered presumptuous to assert that it is at least worthy of careful attention.”

Where it can possibly be arranged, the Inspector should contrive to have several depôts or yards to cart night-soil and ashes too, by this method the cost of carting will be reduced, and the evils arising from a large yard will be avoided.

It must also be borne in mind that to try to lower the rates, or to reduce the cost of removing night-soil, &c., by simply reducing the workmen's wages is a false economy which will never succeed; if we expect a fair day's work let us honestly pay a fair day's wage.

The following is a copy of regulations for night-soil department, which I have just got printed for our own use, which may be of service in new districts.

### RULES AND REGULATIONS

TO BE OBSERVED IN THE NIGHT-SOIL DEPARTMENT.

#### *Foremen and Nightmen.*

**THE** foremen and men for night duty will assemble at the

depôt Street, at 10.30 p.m. each night : the foreman will instruct his men what part of his division they are to commence emptying at, and see that they are provided with candles or lamps, barrows, shovels, brooms, and other articles necessary for their work during the night, and will examine all horses before they commence work, will see if any are lame or unfit for work, and if so send them back ; and to arrange the time and place for the cartmen to meet them in their respective divisions, and to instruct them where to cart the manure and rubbish, taking care that no manure or rubbish is deposited on any building land, or that any soil be scattered in the streets. The foreman will receive instructions nightly from the Inspector where to cart the soil and rubbish, and must carry out all orders given by him. The foreman will be held responsible for the proper cleansing of his division, for the orderly conduct of the men under him, and for the due care of all property committed to his charge.

The men will commence work at 10.30 p.m., and must present themselves at the Chester Street depôt to book off at eight o'clock in the morning.

All damage to property to be made good by the person by whose act or default the damage arises. Any person guilty of drunkenness, negligence, swearing, refusing to obey, or other improper conduct will be discharged.

The ashpit men will, before going home each morning, wash the barrows, shovels, and brooms, and put them away. The carters will thoroughly wash the carts and put them into the sheds before leaving at eight a.m.

The Inspector will be present at eight o'clock each morning at the Chester Street yard, at which time he will hear any complaint which the men may have to make.

All the wages will be paid at eight a.m. on Saturday. Any man wishing to leave his employment must give a week's notice before doing so, except in cases of sickness and special permission.

The men are cautioned against taking away any loose property which may be lying in the back yards, although appearing to be worthless or useless. Any man found taking such articles will be handed over to the police Authorities.

BY ORDER.

## CHAPTER VI.

## CONTAGIOUS AND INFECTIOUS DISEASES.

SOME knowledge of contagious and infectious diseases, and the reasons why persons affected by or recovering from them should not appear in public, is of the utmost importance to the Inspector. By the term contagious disease, we understand a disease which imparts its infection by contact or touch; by the term infectious disease, we understand a disease which transmits or imparts a diseased matter known as a germ, not necessarily for such transmission to be by actual or direct contact alone. The following are some of the principal diseases with which the Inspector will have to contend :—Small-pox, Typhus Fever, Scarlet Fever, Typhoid Fever.

All work which the Inspector has a desire to undertake for the purpose of preventing the spread of infectious diseases should be done with the consent of the Medical Officer of Health; and although this work is really under the direct orders of that officer, it is essential that the Inspector should be well versed in the practice of disinfection, and putting the orders of the Medical Officer into practical operation.

The Inspector will generally receive a copy of the Registrar's weekly return from the Medical Officer, by which he will find all houses where deaths have occurred from

infectious diseases during the week. He will at once proceed to call at each house, and fill up a report sheet for each case (the forms may be had at the publishers of sanitary forms.) He will then make arrangements, to suit the convenience of the householder, for having the house stoved; that is, if the patient is recovered, or removed to an hospital, or when unfortunately removed by death. The stoving should in all cases be undertaken by the Sanitary Authority, as provided for by Section 120 of the Act 1875. Isolation is another matter which the Inspector will do well to direct his attention to. If his Sanitary Authority have an hospital, or an arrangement for the use of some other hospital, the work will not be quite so difficult. If he finds that a patient cannot be properly isolated at home, which be it remembered can only seldom be thoroughly done, it will be his duty to inform the Medical Officer of the fact, who will probably write him an order out for the immediate removal of the patient; that is, presuming the Medical Officer to be satisfied that there is not sufficient lodging or accommodation for the patient without removal, as per Section 124, Act 1875.

In visiting houses where infectious diseases have occurred, great care must be taken in making a strict investigation into the sanitary condition, not only of the individual house but of the whole street, noting minutely the mode of ventilating the sewer and private drains, also the position of the water-closet soil pipe, also the proximity of the common privy to the well or water supply; if he is investigating after a case of scarlet fever, inquire what school the child attended, or if an adult, the proximity of the dwelling to a slaughter-house, or pools of stagnant water; if a case of typhoid, inquire as to



parity of milk and water supply, also as to ventilation of private drain; if inquiring after a case of typhus, bear in mind how highly infectious this disease is known to be, and direct his attention to want of isolation, destitution, and overcrowding.

It may be here remarked that properly constructed mortuaries are essential to sanitary progress.

Disinfection may be briefly explained as follows:—“*A process by which chemically to destroy specific morbid poisons.*”

Now to do this effectually has been the subject of much discussion, not so much upon the fact that certain chemical agents, acting upon the organic matter contained in such morbid poisons, change their composition, and thereby rendering them non-effective as propagators of disease. But the discussion has mostly been directed to the nature of the agent required for the special purpose, and upon this point is the great liability to get wrong, inasmuch as it is not an uncommon occurrence to introduce a strong smelling acid, which only replaces the previous offensiveness, without in the least answering the purposes of a disinfectant. As to the disinfecting of bedding there is not much difference of opinion; the effectiveness of subjecting it to a dry heat of 230 degrees seems to be generally acknowledged. We have, however, to deal with articles which cannot be so treated with dry heat, the room, for instance, from which the patient has been removed, must be made as near air-tight as possible by pasting stout paper over every crevice, then burn sulphur in an iron pan (which gives off sulphuric acid gas, some medical men advise chlorine; your medical officer will advise you on this

point), and keep the room closed for several hours, after which allow a free circulation of air by opening windows and doors.

Then follows a very important item in the art of disinfection—that is to have the paper stripped clean from the walls, not leaving a single particle; to get this thoroughly done, you will have to persevere, but never mind, it must be done. Serve notice upon the owner to cleanse and disinfect under Section 120, Act, 1875, which gives ample powers, and see that it is carried into effect, anything short of this will not be disinfection.

Amongst the most useful disinfectants for general purposes, the following may be mentioned:—

Chloride of lime, in powder and solution, carbolic acid, chlorine, chloralum, turpentine, and terebene.

It will be advisable for us to glance at the effects of some of these disinfectants upon organic matter, so that we may understand the work upon which we are engaged.

Disinfectants are of two classes, those which hasten decomposition, and thereby bring the organic matter to rest by destroying, and those which preserve organic matter from decomposition.

To the first class, chlorine and permanganate of potash (Condy's fluid), and ozone belongs.

To the second class carbolic acid belongs.

We will take chlorine first as one of the most important.

*Chlorine* is a gas of a suffocating nature, and when breathed irritates the air passages, it is heavier than air, it

decomposes matters containing hydrogen with great energy, it immediately decomposes sulphuretted hydrogen, when mixed with hydrogen it forms hydrochloric acid. Chlorine is undoubtedly a powerful disinfectant.

Remembering that it is in a gaseous form, we must bear in mind that it is not applicable in its gaseous form entirely for disinfecting purposes.

We, however, find that H. Ledger and Co. supply us with chlorine in the form of the "Universal Disinfecting Powder," which is composed of 70 per cent. of chloride of sodium and chloride of calcium, and 12 per cent. of sulphate of zinc, and the rest moisture.

This powder, when coming in contact with water, liberates chlorine, and thus produces one of the best known disinfectants for cesspools, ashpits, privies, urinals, slaughter-houses, drains, sewers, hospitals, and sick rooms.

*Permanganate of Potash* (*Condy's fluid*) has the power of rapidly and effectually oxidizing organic matter, it has no corrosive action and no smell, it is well adapted for use in the sick room.

*Ozone* has an odour similar to diluted chlorine, has an irritating effect upon the air passages, is a powerful oxidizing agent. Paper soaked in a solution of manganous sulphate indicates the presence of ozone by turning brown. Ozone, when heated to a little over 212 degrees, is converted into ordinary oxygen.

Ozone may be procured in the shape of the disinfectant, known as "Terebene," designed by F. T. Bond, Esq.,

M.D., B.A., F.C.S. It is a liquid, and when exposed to the air develops ozone. The odour is of a pleasant nature, resembling pine wood. The fragrant aromatic and agreeable smell constitutes this one of the best disinfectants for the interior of sick rooms or hospitals.

## CHAPTER VII.

## VENTILATION.

THIS subject has of late years been dwelt upon at great length, by many very able men. Ventilation may be considered as being the art of supplying the requisite quantity of pure air into the interior of a dwelling or other building, and extracting the foul air therefrom, in the most effectual, cheapest, and least perceptible manner. Now how to do this is the question which naturally arises. Many methods have been tried from time to time, the one which is evidently the favourite at the present time, is the vertical air tube. There is also a system introduced many years ago, I am informed by the respected Medical Officer of Health for Carlisle, Dr. R. Elliot, M.D. and J.P., which the Inspector will find easily adapted to the humblest cottage, and the largest mansion. The plan is to place a bar of wood, made to fit neatly underneath the lower sash of a room window, by which means an open crevice is left between the two sashes in the centre of the window, thus directing a continual stream of pure air towards the ceiling of the room, on the exact principle of the vertical tube system, the fastening of the sash is done by inserting the thumb screw in the sidepiece of the sash instead of the centre. The plan is an admirable one, and well worth the attention of those interested.

When we speak of *pure air*, we understand it to be air composed as follows, 79 parts of nitrogen, 21 parts of oxygen, and 4 parts in 10,000 of carbonic acid gas. In ventilating a room, we must not allow the current of air to exceed the rate of 3 feet per second, the test may be made by that useful instrument, the Anemometer. The space allowed per head in many lodging houses, is 300 cubic feet, in hospitals, 2,000 per head.

The Inspector will often find opportunities for expressing his opinions, and carrying out his ideas as to ventilation, and occasionally as to sewers and drains.

That improved Health indicates increased wealth, few will deny. If Sanitary Inspectors can by removing the stinking accumulations of filth which surround us, save a few poor fellow men whose names crowd the death lists of the Registrar Generals' Report year after year, under the head of zymotic disease, they will not only be doing a good work morally, but in the same ratio be adding to the prosperity of the country.

The following is an extract from the Carlisle Journal, of January 23, 1877, giving my report, which I presented to the Health Committee of Carlisle, during the week preceeding that date, which shows the difficulties to contend with.

*Extract from the "Carlisle Journal," January 23rd, 1877.*

"THE INSPECTOR ON SEWER VENTILATION.—The Inspector in his report said he would take this opportunity of making a few remarks on the ventilation of sewers and drains. The conclusion arrived at by the Committee to replace the present solid manhole covers with perforated

covers of improved pattern was a sound one as far as the main sewers are concerned. But they must not lose sight of the fact that they have also branch sewers and branch drains that are not fitted up with manholes and will not receive that amount of benefit from the replacing of covers that will be received by the main sewers.

“What he meant by branch sewers are those generally known as back-street sewers, or where the drains of more than one house are connected together, which the Town Clerk is of opinion the Urban Authority are liable to cleanse, repair, and ventilate. For the purpose of explanation he directed attention to the branch sewer and drains behind Victoria Place, where about twenty water closets send their contents through long lengths of private drains.

“There three soil-pipe ventilators figure in positions where circumstances have placed them, and are acting as ventilators not only for the water-closet and private drains belonging to the person who erected them, but also for the branch sewer, thus concentrating anything that may be brought out of the sewer on his own premises, and what may be the result of bad workmanship in drain or sewer other than his own; whereas if each soil-pipe or the head of each private drain were fitted with an efficient ventilator, any dangerous gas sent forth would be so diluted as to be practically harmless. It was his firm opinion that they would not have done justice to the ventilation of the sewers for which they were responsible until they either compelled individual owners to ventilate the heads of their private drains, or the Committee to ventilate the heads of the branch

sewers. With a view of carrying out this principle, he proposed to submit any case coming under his notice where improvement is required, so that any particular instance may be treated upon its merits.—He accordingly reported two cases where want of ventilation and erroneous ventilation had caused fever, and notices would have been served but the Committee thought that probably if the improvements were suggested to the owners they would be adopted.

“The Inspector agreed to take this course, which in such cases will be adopted for the future.”

Although the removing of Nuisances outside dwellings will occupy much of the Inspector's time, it will not by far be his most important work, the nuisance to be contended with, inside the dwellings of both rich and poor, are numerous and important.

In the dwellings of the poor will be found, over-crowding and filth, which must be followed up with notices to abate, by quitting the lodgers or taking larger houses, and by limewashing, scrubbing the floors and woodwork.

In the houses of the rich, the nuisance assumes a more refined but deadly form, namely, sewer gas, coming from the unventilated soil pipe, or the slopstone waste pipe in the cellar, kitchen, which is often answering as ventilator for the branch-drain, and main-sewer, by charging the house with sulphuretted hydrogen, and implanting the seeds of Typhoid in the systems of many unsuspecting useful men to Society, whom we can barely afford to spare.

I am fairly within the mark when I say, that hundreds of cases have come into my hands for investigation, where



upon examination, I have found the usual appliances, as though the drains, water closet, and water supply, had all been designed for the purpose of providing the house with an unlimited supply of Typhoid fever.

In these cases, notice must be served upon the owner, requiring him to abate a nuisance, arising from a drain or water closet so foul, for want of ventilation thereto.

The ventilation of water closet soil pipes, drains, and sewers, I am sorry to say, receives far too little attention at the hands of our Local Sanitary Authorities ; the water closet soil pipe should be continued, full size, to a few feet above the eaves. There are some patent arrangements for these purposes, which may be seen at work in various parts of the country.

For particulars as to ventilating drains and sewers, which subject in itself would fill a larger volume than this, I would refer the reader to that first class work, published by Baldwin Latham, Esq., C.E., entitled Sanitary Engineering.

## CHAPTER VIII.

## WATER SUPPLY.

THIS is a subject that will require much attention and care at the hands of the Inspector. The question on water for the examination for the Sanitary Institute may be fairly answered as follows :—

Water should not be sparkling, as the chances are that organic matter is producing such sparkling effect.

Water should not have any offensive smell.

Water should not contain solid matter in suspension. and should be colourless.

There are many ways in which water will be found to be polluted, but the most prevalent one is the close proximity of a defective drain, and an offensive leaky ashpit and privy. This is a matter of quite common occurrence, to find the contents of a drain or privy leaking into a well from which the domestic water supply is taken.

In coming across such cases, action must be at once taken as provided by the 70th section, cap. 55, that is to say: take a sample of the water to the Public Analyst, and after receiving his certificate, lay it before your Committee. If the water is polluted, intimate to the owner (by circular

preferred) that the 70th section requires you to summon him (the owner or occupier) before the Magistrates to show cause why an order should not be made upon him, requiring him to close the said well ; and further, intimate that if he is agreeable to do the work within seven days, you will allow the proceedings to be staid in the meantime.

In sending water to be analysed, clean out well a quart stoppered glass bottle, fill with the water, seal it, and send it to the Analyst the same day.

Lead service pipes should not be used for supplying water, inasmuch as under certain conditions they are likely to contaminate the water.

Shallow wells are not to be depended upon. When water is obtained from wells, they should be of sufficient depth to be free from surface soil water.

Great care must be exercised in the construction and arrangement of the pipes and fittings for the domestic supply, to prevent pollution. Water absorbs gases to a surprising extent, and on this account the overflow pipe from the cistern should discharge on to an open grate outside the main-wall, and not on any account be allowed to discharge direct into a fall pipe or drain, or water-closet soil-pipe.

The following suggestions, extracted from "Suggestions as to Main Sewerage, Drainage, and Water Supply," by R. Rawlinson, Esq., C.E., C.B., will be found to be of service to the Inspector, containing, as they do, the result of a large and important experience :—

*"Water Supply.—Suggestions.*

"The general principles of water-supply may be stated briefly as follows :—

“ 1.—To select the purest available source after careful analysis.

“ 2.—To filter the water, if necessary, in order to free it from suspended matter and from dissolved organic matter.

“ 3.—To store it in covered tanks, and to raise it a sufficient height for distribution by gravitation.

“ Applying these principles, water may be obtained—

“ From rivers and streams.

„ natural springs.

„ wells artificially formed.

„ impounding reservoirs.

„ a combination of two or more of the sources named.

“ And may be conveyed for distribution—

“ By means of open conduits (before filtration).

“ By means of covered conduits, always *after filtration*.

“ By means of cast-iron pipes under pressure.

“ Where a district is to be supplied with water, all other things being equal, the softest and purest water should be adopted.

“ A water-supply may be gravitating, or the water may be pumped by steam-power. The relative economy of one or the other form of works will depend on details of cost and quality of water. As a rule, gravitating works require the

largest capital. The annual working expenses of a pumping scheme may, however, be granted.

“Reservoirs, for service distribution, should be covered.

“If filters are used, the water should not be exposed in open reservoirs and tanks after filtration.

“Cast-iron pipes, properly varnished, should be used for street-mains. It is not advisable to use mains less in internal diameter than three inches.

“Lead should not be used with soft water, either in service pipes or in cisterns. Wrought-iron tubes with screw joints may be used for house service. All house taps should have screw joints, and be of the description known as “*screw-down*,” so as to admit of easy repairs.

“In jointing and fixing wrought-iron service pipes care should be taken to insert double screw joints at convenient points, to allow of the removal of a length of pipe for alteration and repairs.

“Wrought-iron service pipes are cheaper, stronger, and more easily fitted than service pipes of lead. Certain sorts of made ground, in towns, act rapidly and injuriously on both lead and iron pipes, such as furnace ashes, waste gas, and chemical refuse, old building refuse containing lime. Pipes should not be laid in such material without a lining of sand or puddle, or other special protection.\*

“Earthenware pipes may be used for water conduits, provided the joints are not placed under pressure.

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“\* Wrought-iron service pipes for gas are laid in a wooden trough V shaped, which is filled with asphaltum around and over the pipe so as to protect it from the subsoil. Some of the London gas companies protect wrought-iron pipes in this manner.

“Aqueducts of iron will, probably, be cheaper than masonry or brick-work constructions.

“Water may be brought in by gravity; that is, water obtained at a distance may be found at such an elevation above the district to be supplied as to allow of its flowing through conduits or pipes to the tanks or cisterns from which it is to be distributed. A fall of five feet per mile is sufficient for a conduit of two feet diameter. Conduits of larger diameters may have less fall, down to six inches per mile, as on the New River, London.

“Well-water will vary in purity according to the nature and the soluble matters contained in the ground from which the well derives its supply.

“Shallow wells are always liable to pollution from vegetable matter, or even from animal matter in the surface soil. Deep wells only, *i.e.*, wells of a sufficient depth to afford water of the requisite purity, should be sunk; and the surface-soil water should be cut off from the deep water by casing the well above.

“Salt rock is found in the new red sandstone formation. There is risk in deep sinking from this cause; but good water is frequently found in the new red sandstone.

“A spring is the lowest point or lip of an underground reservoir of water in the stratification. A well sunk in such strata will most probably furnish, beside the volume of the spring, an additional supply of water.

“Natural springs may be utilized by storing the water in a reservoir which will contain the flow of one entire day, or longer period.

“Such reservoirs should be walled with masonry, and may be covered in to protect the water from contamination.

“Springs of water at a distance may be conducted in channels contouring the intervening distance.

“The fall for a conduit may vary according to circumstances. The fall should not be less than one in 10,000 nor greater than one in 300, unless cast-iron pipe conduits are used.

“In forming an earthenware pipe conduit great care must be taken to make the trench water-tight, and then to lay and joint the pipes so as to secure that the conduit shall be sound and water-tight through its whole length, to prevent leakage into the subsoil, and to obviate the risk of impure water from the subsoil entering the pipe.

“In forming a conduit the pipes should be laid in straight lines, from point to point. There should be means of inspection and ventilation in each quarter mile, and of washing out at all convenient points.

“Valley lines may be crossed by means of cast-iron syphon-pipes; that is, a pipe may be laid across a valley to conduct the water under pressure.

“All valley or syphon-lines should have double the fall in their length of the ordinary conduit.

“There should be means provided to wash out and cleanse such syphon-pipe or pipes.”

## CHAPTER IX.

## DRAINAGE.

COMPLAINTS of nuisances arising from defective drains will occupy much of the Inspector's time in making investigations in reference thereto. The draining of all dwellings and the sewerage of all urban districts must be understood as work that cannot be shirked. It is, therefore, essential for the Inspector to make himself conversant with the acknowledged laws and conditions of good drainage, not that it will be a part of his duty (only in special cases) to carry out a system of sewerage or draining, but for the purpose of enabling him to detect the defects in existing drains when making his regular inspections.

In passing, I might remark that the Inspector will do well never to allow bell traps to be used.

The reader cannot do better than thoroughly digest the following 23 articles, which are extracted from a work entitled "Suggestions as to Preparation of Plans as to Main Sewerage and Drainage, and as to Water Supply," by R. Rawlinson, Esq., C.E., C.B., Chief Engineering Inspector to the Local Government Board, and who kindly gave me his permission to make these extractions :—



“ 1.—Natural streams should not be arched over to form main sewers ; because a natural stream may drain an area very much larger than the area built over, and consequently a culvert (or sewer) of capacity to remove flood waters in a wet season would be comparatively dry during a dry season, and any sewage then flowing in would stagnate and evaporate, causing nuisance.

“ 2.—Valley lines, natural streams, and surface areas may be improved, so as to remove more readily surface water and extreme falls of rain ; that is to say, streams filled up by accumulations of refuse may be cleansed and deepened, and areas liable to be flooded may be raised or be protected by embankments.

“ 3.—Main sewers need not be of capacity to contain flood-water of the area drained, as such flood-water should be passed over the surface.

“ 4.—Main sewers should be laid out in straight lines and true gradients, from point to point, with side-entrances, or with manholes, and flushing and ventilating arrangements at each principal change of line and gradient. All manholes should be brought up to the surface of the road or street to allow of inspection, and should be finished with a cover easily removable. When sewers are laid out in ‘straight lines,’ and the Surveyor insists upon absolute truth of workmanship both in line and in gradient, the work will necessarily be well done. With manholes and lampholes at each change of line or of gradient, the Surveyor, by removing the covers, can at any time set out the central line of the sewer upon the surface, and can ascertain the depth from the

surface to the sewer at any intermediate point, and so find the exact position of any side junction.

“ 5.—Duplicate systems of sewers are not required. Existing road-drains and drains to natural streams in valley lines may be retained for storm waters, and may be improved, or, if necessary, enlarged. Two sets of main sewers with two sets of house-drains will be costly to construct, and, if constructed, will often lead to complications tending to defeat the proposed uses. The so-called clean water sewer cannot, in many cases, be large enough to receive storm-water, and in dry weather it would of course be dry. The sewer proper would be without the flushing and cleansing given during falls of rain, and the washings off land, ditches, roads, roofs, yards, and gutters, during the first falls of heavy rain, would, in many cases, be as polluted as the sewage in the true sewer. Supposing two sewers in a street, and two sets of drains from each house on each side of such street, the drains must interlace the duplicated sewers, the foul water drain communicating with one, the surface water drain with the other. Under such circumstances it would be almost impossible to prevent builders and workmen from entering the sewers with their drains indiscriminately. Moreover, if the duplicate sewers were not absolutely water-tight, and the subsoil also water-tight, the fluid in one sewer would, by filtration and percolation, act and react upon the other sewer.

“ 6.—Earthenware pipes make good sewers and drains up to their capacity. The pipes must, however, be truly laid, and securely jointed. In ordinary ground they may be

jointed with clay. In sandy ground, special means must be used, such as by bedding the joints in concrete. House-drains should, in all cases, be laid in concrete. If the subsoil is porous the trench should be lined with clay-puddle. Special care should be taken to prevent any contamination of wells by sewage when the water from the wells is to be used for domestic purposes. Earthenware pipes are rarely true in form, as the clay shrinks and becomes distorted in drying and burning. They should therefore be sorted for use so as to form one even line, and in laying, the joint should not bear in the socket in such manner as to be liable to fracture, but the pipes should bed evenly and solidly in the trench, the sockets being free from pressure, a grip, or small trench, being cut to receive the clay, or concrete, upon which the joint is to be made.\*

“7.—Brick sewers ought to be formed with bricks moulded to the radii.

“8.—Brick sewers should, in all cases, be set in ‘hydraulic mortar’ or in cement. In no case should any sewer be formed with bricks set dry, to be subsequently grouted. Where half-brick arches are used the top of such arch should be covered with concrete not less than three inches in depth, and made level over the top of the arch. Half-brick sewer arches are liable to damage if they are not protected by concrete, as a blow or undue pressure on any part or any joint may force a brick out of place; a covering

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\* “*Note.*—Sanitary sewer-pipes, if more than eighteen inches in diameter, will be heavy to handle and difficult to joint, and may cost more than a brick sewer of similar dimensions set in cement and concrete and not make such sound work.

or bedding of concrete will tend to prevent this form of damage and failure.

“9.—Main sewers may have flood-water overflows wherever practicable, to prevent such sewers being choked during thunderstorms or heavy rains. An overflow, to be of most use, should permit the sewer to be flowing full, and it should be so situated, formed, and protected, as to relieve the sewer by an opening formed like a bye-wash.

“10.—Sewers should not join at right angles. Tributary sewers should deliver sewage in the direction of the mainflow.

“11.—Sewers and drains, at junctions and curves, should have extra fall to compensate for friction.

“12.—Sewers of unequal sectional diameters should not join with level inverts, but the lesser, or tributary sewer, should have a fall into the main, at least equal to the difference in the sectional diameter. The junctions of sewers and drains should be made with care, so as to permit of the delivery of sewage from side sewers and drains in such manner as shall not tend to impede the sewage of the main sewer in its flow. If the inverts of tributary sewers are not above, or, at the least, are not on the level of the ordinary flow of sewage in the main sewer, such tributary sewers, or drains, will be liable to be back-watered, in which case deposit will take place in the length of submerged invert, and so the tributary sewer, or drain, will become choked with its own silt. Many drains are so choked, where all the inverts in a flat district join upon the same level, because the sewage of the main sewer, which is in some degree constant, back-

waters the inverts of the tributaries as described, which tributaries are only in use intermittently.

“ 13.—Earthenware pipes of equal diameters should not be laid as branches or tributaries, that is, 9 in. leading into 9 in., or 6 in. into 6 in., but a lesser pipe should be joined on to the greater, as 12 in. to 15 in., 9 in. to 12 in., 6 in. to 9 in., and so on.

“ 14.—House-drains should not pass direct from sewers to the inside of houses, but all drains should end at an outside wall. House-drains, sink-pipes, and soil-pipes should have ample means of external ventilation. In towns where houses have to be drained from back to front through the basement the drain-pipes should have an effectual joint, and be bedded and covered in concrete, such drains being ventilated, back and front, on the outside of the house.

“ 15.—Sinks and water-closets should be against external walls, so that the refuse-water, or soil, may be discharged into a ventilated trap and drain outside the main wall. Down-spouts may be used for ventilation, care being taken that the head of such spout is not near a window. Water-closets or sinks fixed within houses, and having no means of direct day-light and external air ventilation, are liable to become nuisances, and may be injurious to health; and if such sinks and water-closets cannot be ventilated in an efficient manner they had better be removed.

“ 16.—Inlets to all pipe-drains should be properly protected; that is, no pipe-drain should have its upper end exposed so as to admit sticks, stones, or other solid materials being accidentally or mischievously passed in.

“ 17.—Side-junctions for house-drains should be provided in all new sewers and drains. The position should be sketched, and indicated by figures in a book or on a plan. Side-junctions not used at once should be carefully closed for subsequent use. If side-junctions are not provided and put in as the sewers are being constructed or laid, the cost of subsequent provision and insertion will be much greater. It will be cheaper to insert extra side-junctions during constructions rather than to have pipes to remove or brick sewers to cut after the trenches have been filled in and become consolidated, and the road or street surfaces made good.

“ 18.—A record should be kept by the Surveyor of the character of the subsoil opened out in each street as it is being sewered or drained. A sketch-book may be used for the purpose, a section being drawn on a page to show the character and variety of the subsoil as excavated in each street or road, the depths of the various layers, as of sand, gravel, clay, rock, or other material, being described in writing and also figured in the diagram; these books to be indexed, and preserved with the plans for subsequent reference and use.

“ 19.—Sewers and drains should be set out true in line and in gradient. All the materials used should be sound, and the workmanship should be carefully attended to. Surveyors who have had little practical experience in sewer construction do not at once perceive the necessity for straight lines, true gradients with manholes, or lampholes, at the changes of line or gradient; the reasons will, however, become obvious when the works have been completed, as the Surveyor will find that truth of line and of gradient can

only be obtained by a use of good material and the best of workmanship; the sewer-trench must have been excavated carefully and must have been shored properly and strongly, the trench must also have been filled in carefully. The manholes and lamp-holes afford means for ready inspection, as also for flushing and cleansing; and, as previously stated, the line of the sewer can be readily and accurately indicated upon the surface of the street or road, and the exact position and depth of every side junction be found. In main streets having much traffic, 'side entrances' may have to be used instead of manholes. Each manhole may be a '*flushing chamber*,' and each manhole and lamphole may also be a sewer ventilator. Sewers and drains which have been set out and constructed true in line and in gradient are, for all subsequent time, under the ready inspection of the local Surveyor.

"20.—"Sight-rails" should be put up in each street before the ground is opened out, showing the centre line of each sewer and depth to the invert. The proper use of sight-rails in sewer and drain construction, when put up by the Surveyor, will enable the foreman to set out and excavate the trench truly; these sight-rails should be strong, and should also be securely fixed on firm ground; that is, beyond the influence of the excavation to be made, and if the substrata is peaty or such as will shrink under pumping to lower the subsoil water, care must be taken that the sight-rail or bench-mark to be worked to is in such position as to remain unaffected, or the result will be a crippled sewer; that is, the grade and line will not be true.

"21.—Sewers, having steep gradients, should have full

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means for ventilation at the highest points.

“ 22.—Tall chimneys may be used, with advantage, for sewer and drain ventilation, if the owners will allow a connexion to be made.

“ 23.—Sewer-outlet works should be simple in form, cheap in construction, and so arranged as to remove all solids, sediment, and flocculent matter from the sewage. Some diagrams of works of this character will be found at the end of these “ Suggestions.”



## CHAPTER X.

### LEGAL PROCEEDINGS.

*A thorough knowledge of the provisions of the Acts respecting Nuisances and Adulteration.*

The various Acts to which the Inspector will have to direct his attention, are :—

Public Health Act, 1875.

Sale of Food and Drugs Act, 1875.

Rivers Pollution Prevention Act, 1876.

An Act for the Better Protection of Infant Life, 1872.

Petroleum Act, 1871.

An Act for the Better Regulation of Bakehouses.

That the "Public Health Act, 1875," is a useful piece of legislation none will, I think, deny, especially those, who, previous to the consolidation of the various Sanitary Acts had to contend with so many different Acts, upon one general subject. There are some certainly who say they fail to see any great improvement. The fact is simply this, that there is more to be complained of for want of its better

application, than there is in any defect of the Act itself is a certainty.

That there is a want of improved legislation upon certain Sanitary matters I do admit.

In all matters where an opinion upon a legal question is required, it will be clearly understood that the Clerk to the Sanitary Authority, who of course is nearly always a Solicitor, is the proper person to seek advice from, but it may be as well to explain that my motive in making remarks on this subject is, that there are always many little matters in an Inspector's practice in which he will be called upon to give opinions without having an opportunity to consult the Clerk, and as a rule Clerks cannot be troubled with so many matters, unless of great importance.

In making out forms, notices, and other documents under the Acts, great care should be exercised in following as closely as possible the exact wording of the Act.

It will be necessary on an Inspector entering upon a new appointment, to direct the attention of the Committee to the 259th section of the Public Health Act, 1875, and have a resolution on the Books authorizing him to appear in prosecutions on their behalf, presuming that the same method is adopted as is carried out in most large Towns, namely, that the Inspector conducts his own Sanitary prosecutions, which in my opinion is advisable, except in very important defended cases, when the Clerk should be called in.

In giving evidence before the Magistrates, Inspectors will do well not to appear to want to press cases against

defendants too severely. It is advisable to leave that to the discretion of the Bench.

The words of J. Ashurst are well worth remembering, when he said :—

“ It is beyond the power of the law to rectify men's minds, and to infuse into them that noble fire which burns in the breasts of good men, and prompts them to doing of praiseworthy actions, and promoting the happiness of their country, and the good of their fellow-creatures ; but it is in the power of the law to take from evil-minded men the ability of doing mischief, and to restrain them of that liberty which they so grossly abuse.”

The Inspector will be able to do a good deal by persuasion, which, in many cases, is preferable than the application of the law.

In carrying out the provisions of the “ Sale of Food and Drugs Acts, 1875,” the purchaser, who is usually the Sanitary Inspector, must be cautious in asking very exactly for what he requires, and not to inform the vendor of the purpose for which the sample is required, until the purchase is completed and the change received. He must not do as I have known done, that is, send into the shop some other person to make the purchase on his behalf, inasmuch as the purchaser must be some one of the persons specified in the 13th section of the Act.

While on this subject, two defects in the Act may be pointed out.

The first, which affects the consumer mostly, is that the Act requires that a label shall be affixed to articles sold, stating that such article is sold as a mixture, whereas the

label ought to contain the nature and quantity of such mixture. And for this reason. We will take cocoa as an example, which has been found to contain over 80 per cent. of foreign matter, such as sugar and starch, very few persons ever expecting to know that they have been purchasing such an article.

The next defect affects the Sanitary Inspector in a very serious manner, which may be explained thus:—Sanitary Inspectors are appointed by the Sanitary Authority; any increase of salary has to be sanctioned by this body; in fact, as we all know, they have thorough control in all respects, which generally speaking is quite right.

It so happens, however, that a few of the dealers in the articles included in this Act are members of such Sanitary Authorities. Without casting any slight upon members of Sanitary Authorities, it will be at once seen the very disadvantageous position in which the officials are placed.

It seems quite clear that to expect the carrying out of this Act in a creditable manner, all the Inspectors engaged on this work should be under the entire control of the "Local Government Board," who should appoint such a number as should devote their whole time to the work.

That this would work a great change, I have no hesitation in saying.

CHAPTER XI.

REPORTS.

The Inspector will, of course, be subject to special instructions of his Committee as to presenting reports. It is, however, the custom generally for him to write out a weekly, fortnightly, or monthly report according to the times of meeting. It is also advisable for him to be present at all Sanitary Committee meetings. In the circular issued by the Sanitary Institute, we are informed that each candidate must at their examinations write out a presumed week's work. I have, therefore, introduced the following report, which may be taken as an ordinary specimen of an Inspector's weekly report in a town of 50,000 inhabitants:—

“ TO THE CHAIRMAN AND MEMBERS OF THE  
SANITARY COMMITTEE OF THE ——— DISTRICT.

“ GENTLEMEN,

“ I have respectfully to report to you as follows, for the week ending December 8th:—

“ 10. No complaints received.

“ 32. Nuisances reported upon.

“ 27. Notices issued.

“ 15. Nuisances abated.

- “ 4. Houses disinfected.
- “ 1. Carcase, meat, &c., seized.
- “ 1. Summons issued.

“ As per resolution No. —, I have made a special inspection of the south end of ——— Street, and found many of the dwellings in a filthy and over-crowded condition. The requisite notices have in each case been issued.

“ In accordance with a summons ordered by you to be issued two weeks ago, Mr. ——— appeared before the city magistrates on Tuesday last, when an order was made upon him to construct a roof to his ashpit in ——— Street, within five days, and pay a fine of £1 and costs.

“ As per resolution No. —, I have during the week procured ten samples of milk, which the analyst reports upon in his certificates.

“ I beg to lay before you a complaint I have received from the residents in ——— Terrace, respecting the impure state of the water in the well. There is every appearance of contamination from the adjoining midden. Should be glad for your instructions thereon.

“ I have received the accompanying application for a Slaughter-house License from Mr. ———, No. 10, ——— Street. I would recommend the application to be refused, as the locality is overcrowded and very unsuitable.

Yours obediently,

A——— B———

Sanitary Inspector.”

The figures in this presumed Report are, of course, merely illustrative. Reports will vary according to the matters in hand ; it is, however, advisable for all Reports to be as brief as possible and legibly written, so as not to waste the time of the Committee ; and, before bringing any subject before the Committee for discussion, the Inspector is requested to make all possible enquiries in the matter, and thus be well prepared to answer any question that may be referred to him.

It is not in every district the custom to present a Yearly Report as to Nuisances, but where the arrangement can be made, I would strongly urge it to be done ; I am confident that they cannot fail always to be of the greatest service. As an example, I have here reprinted an exact copy of my last Yearly Report for the City of Carlisle, in reading which it must be remembered that the Report was written in actual practice some 10 months ago, long before this work was contemplated.

TABLE No. 1.

*Offences against which complaint has been made to the City Bench of Magistrates, under the provisions of the "Public Health Acts."*

Nature of Offence.	Number of Summonses issued.	Magistrates' Orders granted, and Convictions.	Penalties imposed.
Selling Unwholesome and Diseased Meat ... ..	6	6	£ s. d. 32 5 0
Neglecting to provide Closet Accommodation after receiving notice ...	—	—	— — —
Neglecting to abate Overcrowding in Dwelling Houses ... ..	1	1	— — —
Neglecting to Repair Defective Drains ...	1	1	0 1 0
Neglecting to Repair Defective Water Closets	—	—	— — —
Obstructing Inspector in the Execution of his Duty	1	1	0 5 0
Neglecting to convert Privies into Water Closets	2	2	2 5 6
Keeping Animals in such a state as to be a nuisance	2	2	0 3 6
TOTALS ... ..	13	13	35 0 0



TABLE No. 2.

*Shewing the Amount of Bad Meat and other Unwholesome Commodities Seized and Destroyed during 1876.*

Class of Meat Seized by Inspector.	Number of Seizures.	Weight in Pounds.	Number of Persons Sum-moned.	Number of Con-victions and Orders.	Amount of Penalties Imposed.		
					£	s.	d.
Beef... ..	1	728	5	5	31	0	0
Mutton ...	—	—	—	—		—	
Pork... ..	—	—	—	—		—	
Fish... ..	1	25	1	1	1	5	0
Ham and Bacon ...	—	—	—	—		—	
Oranges ...	—	—	—	—		—	
Cherries ...	—	—	—	—		—	
Animals ...	—	—	—	—		—	
<b>TOTALS ...</b>	<b>2</b>	<b>753</b>	<b>6</b>	<b>6</b>	<b>£32</b>	<b>5</b>	<b>0</b>

TABLE No. 3.—SANITARY WORK.  
For 12 Months.

Nuisances reported by Inspector	...	...	...	...	240
Legal Notices served to abate Nuisance	...	...	...	...	165
Nuisances abated	...	...	...	...	220
Cases of Fever reported (chiefly illnesses)	...	...	...	...	30
Cases of Smallpox	...	...	...	...	2
Houses Disinfected	...	...	...	...	36
Applications to Magistrates for Orders for Removal of Nuisances	...	...	...	...	6
Orders granted	...	...	...	...	5
Summonses issued	...	...	...	...	13
Convictions	...	...	...	...	13

TABLE No. 4.—GENERAL INFORMATION.

Population of Carlisle City in 1871	...	...	...	...	31,049
Dwelling Houses at present	...	...	...	...	6,336
Licensed Slaughter Houses	...	...	...	...	21
Public Bakehouses	...	...	...	...	33
Marine Store Dealers	...	...	...	...	10
Common Lodging Houses (Registered)	...	...	...	...	9
Water Closets	...	...	...	...	2,930
Public Urinals	...	...	...	...	10
Public Mortuary	...	...	...	...	0
Public Baths	...	...	...	...	0
Public Sewers, Miles	...	...	...	...	12
Special Ventilators at present	...	...	...	...	11
No. of Manholes	...	...	...	...	223
No. of Lampholes	...	...	...	...	147
Dwelling Houses built in 1876	...	...	...	...	131

“TO THE  
CHAIRMAN AND MEMBERS OF THE HEALTH  
COMMITTEE OF THE CITY OF  
CARLISLE.”

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“GENTLEMEN,

“With pleasure I take this my second opportunity of presenting a yearly statement of my labours as your Sanitary Inspector.

“The twelve months just expired have, upon the whole, been quiet from a sanitary point of view. Smallpox has been busy at work around us, principally to the south, but fortunately only two cases have come under notice within the city. Thirty cases of fever have had our attention, most of which have been removed to fever hospitals, as against eighty cases last year. Thirteen summonses have been issued in connection with sanitary prosecutions, as against twenty in the previous year.

“Two hundred and thirty-one new water-closets have been constructed. There are still about three hundred middens in connection with privies which we are regularly abolishing, taking those most offensive first. We may now calculate that, in about two years, all the offensive privies will be replaced with water-closets, and the old ashpits replaced with smaller ones and of less objectionable construction, and in enclosed yards and courts abolished altogether, and the ashes collected daily from the streets.

“Overcrowding in dwelling houses in the poorer parts of the town is not of so serious a nature as in the previous

year. This may partly be accounted for from the fact that there are not so many men now employed on the public works and railway improvements as there were twelve months ago.

“ Structural improvements of a permanent character have been carried out in the courts and yards here mentioned : Ship Inn Yard, Rickergate ; Carruthers’ Court, Drovers Lane ; Rayson’s Court, Drovers Lane ; Matthews’ Court, Caldewgate. There still remains much to be done, which no doubt will receive due attention if your Committee continue to give that willing support they have always so kindly given when required.

“ The suppression of smoke nuisances and the adulteration of food (chiefly milk) are matters worthy of our attention. With respect to the latter we have no analyst, and of course no prosecution can take place. In respect to smoke nuisances, four legal notices have been served requiring furnaces to consume their own smoke. Besides this, I have made it my duty to visit many of the firemen and engine-men, and caution them verbally. Much depends upon these men, and if great care be exercised in regulating their fires much of the smoke which sometimes darkens the principal thoroughfares might be avoided. The large number of locomotives passing through the city contribute much in this class of nuisances.

#### “DISEASED AND UNWHOLESOME MEAT.

“ On examination of Table No. 2, it will be seen that only two seizures have been made of diseased or unsound food, as compared with twelve seizures last year. This, we

may assume, indicates a better state of things, inasmuch as those persons who have been accustomed to speculate in this illegal and dangerous traffic find it very difficult to carry on such avocation, and can now see such trading beset with many dangers, and naturally betake themselves to dealing in a better and more honourable class of food.

“ Weight of food seized in 1875	...	1,699 lbs.
“           ”           ”           1876	...	753 lbs.

#### “CLEANSING OF STREETS.

“The remarks made in my last yearly Report on this subject may still be fresh in the memories of many.

“I would, however, once more direct attention to this most important question—The best method for the immediate and effectual removal of the excrement caused by the large number of animals which pass daily over the streets of a town like Carlisle, situated as it is in the centre of one of the largest agricultural districts in the country, is a subject well worthy of our attention.

“In this department of our sanitary organization, I would respectfully recommend the more constant cleansing of street gulleys (especially in summer months), and thus abate a nuisance which, when allowed to remain, may easily be mistaken for bad ventilation of some portion of the sewer.

#### “THE DISPOSAL OF DRY ASHES.

“The disposal of dry ashes is a subject which for the last six months has been a source of great annoyance, inasmuch as that at the present time we leave the matter entirely in the hands of our Contractor for him to find what place he can for

depositing dry ashes collected from dry ashpits and from the streets in the morning, the result of which is that the so-called dry ashes, which contain vegetable refuse and other offensive matter, are now being deposited in the foundations of future dwelling houses, which is very objectionable.

“To obviate this serious evil, I would respectfully recommend the following plan to be adopted :—

‘That the land known as Battail Holme, lying between the Castle and River Eden, be filled up to the level of the Weavers’ Bank, which would be about ten feet. This work might be accomplished in sections, and have the soil removed before commencing to lay down the ashes, and, on the completion of each section, the soil to be placed on the new ground.’

“By adopting this plan we could find a convenient site for dry ashes for the next few years, and, at the same time, place the level of the land above water mark, which would make the land available for purposes for which at present it is next to useless ; and, by carefully carrying out this scheme, the garden-like appearance of this favourite walk might be preserved, and even for sewage utilization or ordinary agricultural purposes the land would be more valuable.

#### “REMOVAL OF NIGHT SOIL.

“The removal of night soil and the contents of ashpits from our midst is a work which ought to be carried out with the greatest despatch and efficiency, and if, in the least neglected, is a false economy for which in time we have heavily to pay.

By referring to table No. 5 it will be seen that (from March 1st to December 31st) 2,520 ashpits have been emptied, which contained 7,885 loads. With a view of still further improving the efficiency of this department at the same cost as now, I would earnestly recommend the purchase of our own horses instead of, as at present, letting the carting to Contractors, to commence on the 1st September, 1877. If my memory serves me right, Mr. Councillor Milburn promised the Committee to bring forward some new arrangement bearing on this subject prior to the 1st September next.

#### “ URINALS.

“ I should not feel content if I concluded this Report without directing attention to the great want of urinal accommodation. Ten public urinals are insufficient for Carlisle. This subject is one which has on several occasions received the attention of the members of the Health Committee, and no doubt each gentleman of that body is well aware as to the necessity of increasing the number of urinals; but it would certainly be advisable for something in a practical shape to be done, more especially at the south end of Botchergate and the centre of English Street, or Green Market.

“ I am, Gentlemen,

“ Your obedient Servant,

“ JOSEPH ROBINSON,

“ *Sanitary Inspector.*”

## CHAPTER XII.

## CONCLUSION.

It may be in the remembrance of some readers that in the year 1875 an Inquiry was ordered to be made as to the several "Modes of treating Town Sewage," which Inquiry was conducted by R. Rawlinson, Esq., C.E., C.B., Chief Engineering Inspector to the Local Government Board, and C.S. Read, Esq., M.P. This Inquiry was duly made, and presented to both Houses of Parliament during 1876. The Conclusions arrived at in that Inquiry are of so much value to the Inspector, that I considered it wise to repeat them in this work:—

*"Conclusions.*

"1.—That the scavenging, sewerage, and cleansing of towns are necessary for comfort and health; and that in all cases these operations involve questions of how to remove the refuse of towns in the safest manner and at the least expense to the ratepayer.

"2.—That the retention for any lengthened period of refuse and excreta in privy cesspits or in cesspools, or in stables, cowsheds, slaughterhouses, or other places in the midst of towns, must be utterly condemned; and that none of the (so-called) dry earth or pail systems, or improved



privies, can be approved other than as palliatives for cesspit middens, because the excreta is liable to be a nuisance during the period of retention, and a cause of nuisance in its removal; and, moreover, when removed leaves the crude sewage, unless otherwise dealt with by filtration through land, to pollute any watercourse or river into which such sewage may flow. We have no desire, however, to condemn the dry earth or pail systems for detached houses, or for public institutions in the country, or for villages, provided the system adopted is carefully carried out.

“ 3.—That the sewerage of towns and the draining of houses must be considered a prime necessity under all conditions and circumstances, so that the sub-soil water may be lowered in wet districts, and may be preserved from pollution, and that waste water may be removed from houses without delay; and that the surfaces and channels of streets, yards, and courts may be preserved clean.

“ 4.—That most rivers and streams are polluted by a discharge into them of crude sewage, which practice is highly objectionable.

“ 5.—That, as far as we have been able to ascertain, none of the existing modes of treating town sewage by deposition and by chemicals in tanks appear to effect much change except the separation of the solids and the clarification of the liquids. That the treatment of sewage in this manner, however, effects a considerable improvement, and when carried to its greatest perfection may in some cases be accepted.

“ 6.—That so far as our examinations extend, none of the manufactured manures made by manipulating towns'

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refuse with or without chemicals pay the contingent costs of such modes of treatment ; neither has any mode of dealing separately with excreta, so as to defray the cost of collection and preparation by a sale of the manure, been brought under our notice.

“ 7.—That town sewage can best and most cheaply be disposed of and purified by the process of land irrigation for agricultural purposes, where local conditions are favourable to its application, but that the chemical value of sewage is greatly reduced to the farmer by the fact that it must be disposed of day by day throughout the entire year, and that its volume is generally greatest when it is of the least service to the land.

“ 8.—That land irrigation is not practicable in all cases, and therefore other modes of dealing with sewage must be allowed.

“ 9.—That towns situate on the sea-coast, or on tidal estuaries, may be allowed to turn sewage into the sea or estuary, below the line of low water, provided no nuisance is caused ; and that such mode of getting rid of sewage may be allowed and justified on the score of economy.”

These conclusions are of the utmost importance to the Sanitary Inspector, inasmuch, as in many instances he is consulted by property owners as to the best system of closet to adopt in given situations, it is therefore most essential for him to come to some decision upon so important a matter, which is no easy thing to do, without first consulting very carefully the whole of the Official Government Reports, and

the writings of eminent Sanitarians. Upon a few of these points my mind is quite clear :—

1st. That the common privies should be prohibited by law.

2nd. That the “Goux Absorbent Closet” should be adopted where water-closets are not already constructed, but only on condition of their being scavenged by the Local Sanitary Authority.

3rd. That only under special circumstances should water closets be encouraged, and when adopted in lower class property, the “Macfarlane’s, of Glasgow,” or “Bacheldor’s, of Liverpool,” are trough closets, possessing advantages over the ordinary water closet, especially in properties where one closet is used by more than one tenement, and also when these closets are adopted, the flushing of them should be entirely in the hands of the Night-soil Department.

That the “Pan System” of closets has been the means of reducing the death-rate, in various instances there is no denying ; and further, that the “Goux closet” is one of the best, and most sanitary, of the so-called pan systems I am quite convinced.

We are often told by persons in favour of the water closet system that the human excreta passed into the sewers through water-closets only represents about one-hundreth part of the pollution.

For the purpose of clearing our minds upon this point, let us for a moment examine a few figures. Take Birmingham, for example—on page 34, in the Report (just referred

to) we find that the suspended solid matter deposited in the tanks from the sewage amounts to 110,000 tons per annum. Let us now look how many tons per annum are collected by the pail system in the same town.

There are at the present time in the borough of Birmingham about 20,800 of these pail closets, from which is collected 500 tons of solid excreta weekly, or 26,000 tons per annum.

In the Report above mentioned, we are told that Birmingham contains about 8,000 water closets. Presuming then, that these water-closets were converted into pail closets, we should have the contents of 8,000 pail closets saved from the sewers, which would equal (at the rate of  $1\frac{1}{4}$  ton per closet per annum, which is the exact amount, from the figures previously quoted) 10,000 tons.

If, then, we take this 10,000 tons from the sewers, that would leave the annual deposit at 100,000 tons.

The figures now stand at—

Annual Deposit from Sewers.	Solid Excreta and Urine prevented from entering Sewers.
Tons. 100,000	26,000 tons (pails) 10,000 ,, (w.c.)
Total ... 100,000	36,000 tons.

In the face of these figures it is evident that the prevailing opinion must be that the largest amount of polluting

matter entering sewers is in liquid form—that is, if we are to accept it as a fact, that excreta and urine form only one-hundredth part.

It appears, then, we have the option of having 136,000 tons per annum of solid deposit at the sewage tanks, or, by adopting the pail system, have 100,000 tons deposit, and relieve the sewers of 36,000 tons per annum of one of the most highly polluting agents we could possibly pour into these sometimes dangerous conduits.

If, then, it is in our power to reduce the deposit at the sewer outlets by one-fourth of its weight (and probably more) of this dangerous element, and thus relieve the beds of our rivers and our otherwise beautiful sea-shores, I contend it is our duty to take advantage of all available means, and thereby lower our annual list of 8,000 deaths from typhoid fever, and save ourselves the expense of beautifully-constructed water-closets, with their splendid mechanism, so liable to derangement, also from those elaborate sewage works, so often found both costly and useless from a sanitary point of view.

In perusing official returns we find that at the end of 1876 there were 1,536 Sanitary Authorities in this country. From this fact alone it may be assumed that sanitary matters are undergoing some consideration, which it is to be hoped will result in a still further improvement in the general health of the community.

When we are told that the death-rate of London some two hundred years ago was at the rate of 80 per 1000 per annum, and now 22, can we for a moment doubt that

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Sanitation has worked a wonderful change? There is, however, still room for much improvement; many of the simple laws of nature require to be more strictly observed. In the densely populated courts and alleys of our large towns we are able to find sad specimens of human nature, bringing to the mind of those who take time to think, striking proofs of defective Sanitary Legislation, and Organisation. As to the defects in such legislation, there is, I think, no person who has a better opportunity of observing them than the Sanitary Inspector.

It is upon this official that the responsibility rests of practically carrying out the ideas and instructions of the Medical Officer of Health, the Sanitary Authority, and the provisions of the Sanitary Acts. It will, therefore, be interesting for a moment to glance at a few slight defects as examples.

There is one prominent defect to which nearly the whole of the Medical Officers of Health in the country have recently directed attention, that is the want of powers for compulsory registration of cases of infectious disease; and to which, I think, it is only reasonable to add powers to compel Sanitary Authorities to provide hospital accommodation for infectious diseases. There are many Urban Authorities which might be mentioned, that have but very imperfect accommodation of this description.

As to the inspecting of offensive trades and nuisances arising from noxious vapours, I shall make a few remarks—inasmuch, as the duty of inspecting all works where any offensive trade is carried on is one of such importance as to

warrant the appointment of a Special Inspector for each county, or division of a county, varying as to the number of works therein. Such appointments might be filled by those Sanitary Inspectors who felt most disposed to turn their attention to that particular branch, and who were competent to pass certain examinations, held by the authority of the Local Government Board, in whose hands the appointments should be vested; and that duplicates of all Reports should be sent to the Local Authority in whose district the works might be situated to which the report referred. Under the present arrangements it often occurs that the time of the Inspector is so much taken up with the removal of those nuisances of more frequent occurrence, that he has very little time to devote to this important branch of his duty, which, in itself, should be the sole study of one individual, that is, to be in a position to give sound practical advice and instructions to the proprietors of the large number of offensive trades which are now carried on, to the great injury to health and vegetation. In dividing the labour in this form, it would give an opportunity for a certain number of men to devote their abilities and inventive faculties to one special subject and thereby become experts in their department: whereas, under the present system the duties are so numerous and important that before a man is thoroughly expert on every subject, he is called away by death or, from old age, rendered incapable of service.

In briefly considering the numerous duties of the Inspector, and the various subjects with which he is expected to make himself conversant, the contamination of air is the most prominent.

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That the air which we breathe in most urban districts is highly impure, is a fact scarcely to be disputed ; the agents at work, by which this contamination is caused, are numerous : such as foul accumulations of filth, often in a state of putrefaction ; the sending into our midst of dangerous gases, such as carbonic acid gas, sulphurous acid gas, and chlorine, as the results of coal combustion from our factory chimneys and other works ; also the discharges from our sewers and drains, in the shape of sewer gas, containing a large amount of sulphuretted hydrogen, as the results of imperfect cleansing and ventilation of such sewers and drains. Overcrowding may be also mentioned as one of the most wilful of air contaminations, considering the mode of shutting out of our dwellings every particle of outside-air, and thus leaving the inmates to breathe the air which is contaminated by each other.

Next in order may be taken the contamination of our food and water supply, by adulteration of food, diseased meat, &c., and the polluting of our water by sewage matter.

This apparently short list enumerates some of the important causes which, during the year 1875, sent 106,451 persons to their last resting place from zymotic diseases. It is fearful to think of this number dying annually. We ponder over the list of those killed in some railway accident. Board of Trade inquiries are instituted, and every little matter is investigated in the most minute form. Engineers and mechanical inventors tax their brains to invent a remedy. Let us for a moment glance at the number of deaths caused by railway accidents in this country in 1875, and compare



the numbers with those from zymotic diseases in 1875 :—

Railway accidents	...	...	1,234
Zymotic diseases	...	...	106,451

It seems then that with all the dread with which we think of railway accidents, that for every person killed in that way, there are 86 persons killed by zymotic disease ; and year after year goes by and we are still able to find that the figures vary but little.

During the year 1875, we are informed that

20,469	died from	Scarlet	Fever
1,499	„	„	Typhus „
8,913	„	„	Enteric „
950	„	„	Smallpox
23,982	„	„	Diarrhoea

or about 400,000 per annum from from the whole of the zymotic diseases.

If then, by the prevention of the contamination of Air, Food, and Water, we can save a few fellow men, from the vast number which perish yearly, is it not an object worthy of the attention of the noblest and most philanthropic men amongst us ?

29.1.29.  
HMC





