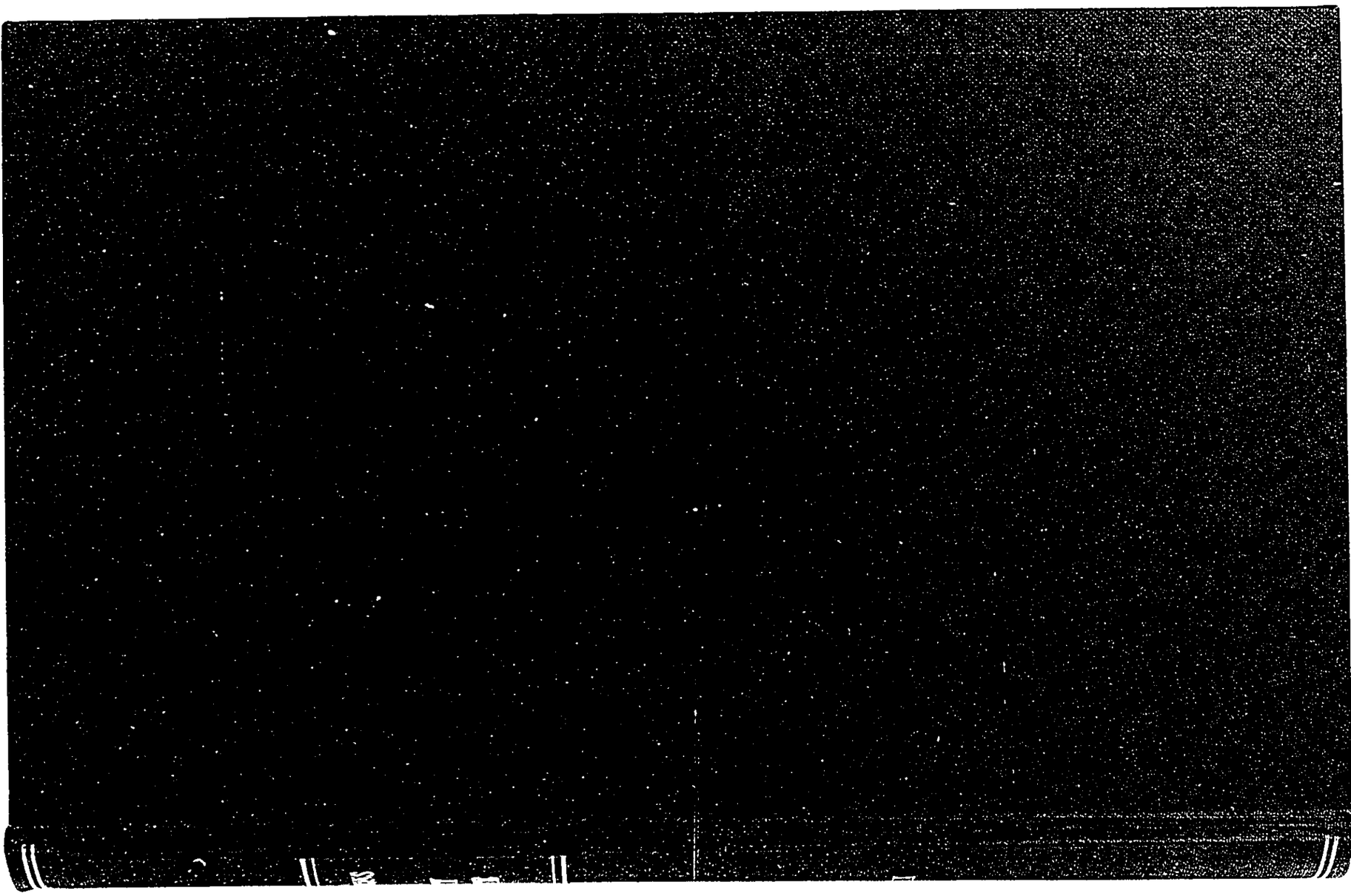

1887-8.

TRANSACTIONS

OF THE

Sanitary Institute of Great Britain.

VOLUME IX.

CONGRESS AT BOLTON.

1887-8.

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1888.

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NOTE.

The publication of this Volume has been delayed so as to include the work of the Institute up to the time of its amalgamation with the Parkes Museum.

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Sanitary Institute of Great Britain.

FORMATION OF THE INSTITUTE.

THE increasing importance attached to Sanitary Science and the recognised position it was assuming in the public mind, appeared to the promoters of the Sanitary Institute fully to justify the formation of a National Society, the object of which should be to devote itself *exclusively* to the advancement of all subjects bearing upon Public Health. In furtherance of the object, a meeting was held at St. James's Hall, on the 13th of July, 1876, at which His Grace the Duke of Northumberland presided, when it was unanimously resolved:—

First—"That in the opinion of this meeting the sanitary condition of this country is still very unsatisfactory, and that further legislation is necessary with a view to its improvement; and that for the purpose of collecting and imparting information upon all matters connected with the subject of 'Public Health' a Society be now formed, to be styled 'The Sanitary Institute of Great Britain.'"

Second—"That the gentlemen whose names are appended be requested to act as a Committee (with power to add to their number) for the purpose of carrying out the previous resolution and of reporting to an adjourned public meeting to be held during the second week in October next."*

The Committee appointed to report upon the subject considered it would add greatly to the usefulness of the Institute if Mayors of Boroughs, Chairmen of Local Boards, Sanitary Authorities, Medical Officers of Health, and all who have to administer the Public Health Acts, would associate themselves with the Institute, either in their individual or corporate capacity, and take part in its proceedings. By thus bringing their united knowledge and experience to bear upon Sanitary matters, the laws relating to the same would become better known and be more efficiently administered.

BASIS OF THE CONSTITUTION OF THE INSTITUTE.

SECTION I.

Charter of Incorporation, Membership, and Government of the Institute.

As soon as practicable a Charter of Incorporation shall be obtained, as it will facilitate some portions of the work of the Institute, more especially the examinations as set forth in Section II. Until a Charter

* An adjourned public meeting was held on the 14th of March, 1877, when the report was unanimously adopted and a Council subsequently appointed to carry it into effect.

is obtained, the examinations shall be continued as heretofore, and a Register of persons certificated as competent to act as Local Surveyors and Inspectors of Nuisances shall be formed.

The Institute shall consist of Fellows, Members, Associates, and Subscribers.

Fellows shall be elected by ballot by the Council, and shall include scientific men of eminence, persons of distinction as Legislators or Administrators, and others, who have done noteworthy Sanitary work.

Fellows are only elected from among the Members, and they must have been Members for at least one year before they are eligible for election as Fellows.

All Fellows shall pay a fee of Ten Guineas on taking up the Fellowship, and such fee shall entitle the Fellow to all the privileges and advantages of the Institute for life without further payment.

Any person proposed by three Fellows or Members, shall be eligible for election as a Member of the Institute.

Members shall be elected by ballot by the Council, and shall be eligible to serve on the Council, and to vote at all Elections and Meetings of the Institute. The admission Fee payable by a Member shall be Three Guineas, and the Annual Subscription Two Guineas.

Medical Officers of Health and Medical Men holding Certificates in Sanitary Science from any University or Medical Corporation shall be entitled to be enrolled as Members of the Institute without Admission Fee.

Members desirous of becoming Life Members may do so on payment of Ten Guineas in lieu of the Annual Subscription.

All persons who have passed the Examination and received the Certificate for Local Surveyor from the Institute, shall, by virtue of having so passed, become Members of the Institute upon the payment of Five Guineas (without Annual Subscription), in addition to the fee paid for the Examination.

Any one proposed by two persons, either Fellows, Members, or Associates of the Institute, shall be eligible to be elected as an Associate of the Institute, the election to be by ballot by the Council. The Admission Fee payable by Associates shall be Two Guineas, and the Annual Subscription One Guinea.

All persons who have passed the Examination and received the Certificate for Inspector of Nuisances from the Institute, shall, by virtue of having so passed, become Associates of the Institute upon the payment of Three Guineas (without Annual Subscription), in addition to the fee paid for the Examination.

Persons of either sex, interested in the advancement of Sanitary Science, shall be entitled to be enrolled as subscribers on payment of One Guinea annually.

Donors of Ten Guineas and upwards shall be entitled to be enrolled as "Life Subscribers," with all the privileges and advantages of Annual Subscribers without further payment.

Fellows, Members, Associates, and Subscribers shall be entitled to attend and to take part in the discussions at all meetings and Congresses of the Institute, and shall have free admission to any

Conversazione given by the Institute and Exhibitions of Sanitary Appliances held in connection with the Institute as long as they continue to pay their Subscription.

Holders of Half-Guinea Congress Tickets are entitled to the use of the Reception Room in the town of meeting, to admission to the Presidential and other Addresses, to all the Meetings, to the Exhibition of the Institute, and to any Conversazione given by the Institute.

The Institute shall be governed by a President, Vice-Presidents, and a Council of Twenty-four, consisting of Fellows and Members of the Institute, of whom not less than two-thirds shall be Fellows. The Council shall be chosen by the Fellows and Members. One-fourth of the Council shall retire annually, and shall not be eligible for re-election for one year.

The first President of the Institute shall be His Grace the Duke of Northumberland. Future Presidents and Vice-Presidents shall be elected by the Council. The Council shall have the power of electing Honorary Members of the Institute, Honorary Foreign Associates, and Corresponding Members of the Council.

Section II.

Objects of the Institute.

To devote itself to the advancement of Sanitary Science and the diffusion of knowledge relating thereto.

To examine and to grant Certificates of Competence to Local Surveyors and Inspectors of Nuisances, and to persons desirous of becoming such or of obtaining the Certificate. The Examinations shall be held at such times and in such places as the Council may direct.

A Board of Examiners shall be appointed by the Council; such Board shall consist of gentlemen representing Medical, Chemical, and Sanitary Science, Engineering, Architecture, and Sanitary Jurisprudence.

The Examination for Local Surveyors shall include a competent knowledge of the Statute relating to Sanitary Authorities, of Sanitary Science and Construction, and of Engineering.

The Examination for Inspectors of Nuisances shall comprise the elements of Sanitary Science, together with Sanitary Construction, and the Statutes relating to the prevention of disease and the suppression of nuisances injurious to health.

Fees shall be charged for the Examinations, and a Certificate of Competence, signed by the Examiners, shall be granted to successful candidates, entitling them to be designated as "Certificated by the Sanitary Institute of Great Britain."

A Congress shall be held by the Institute for the consideration of subjects relating to Hygiene at such times and places as the Council may direct.

Exhibitions of Sanitary Apparatus and Appliances shall be held from time to time as the Council may direct.

Fellows, Members, Associates, and Subscribers shall have the right of Free Admission to the Exhibitions of the Institute whenever they are open. All fees payable by Exhibitors and the Public shall be fixed by the Council and belong to the Institute.

A Catalogue shall be published under the direction of the Council as a permanent record of the Exhibitions.

The Institute shall take such steps as may be within its power to obtain a complete registration of sickness, especially of preventible diseases.

The Institute shall endeavour to secure the services of medical men and others specially qualified to give lectures on subjects relating to the prevention and spread of disease.

The Institute shall encourage the formation of classes for technical instruction in Sanitary Science in such a way as may seem advisable to the Council.

A Library shall be formed in connection with the Institute.

ANNUAL REPORT OF THE COUNCIL

FOR 1886-7.

Ten years have now passed since the Institute was established, a period marked by a rapid increase in Sanitary knowledge, and a general recognition and application of the laws of hygiene. The Institute, endeavouring to keep pace with this advancement, has each year shewn steady progress in the work that it has sought to achieve, work which now receives a large amount of practical recognition from the public.

The Cash Statement shows a steady improvement in the financial position of the Institute; the receipts being larger than in any previous year, and although the expenses also shew an increase, the Council have reason to be satisfied with the general financial position of the Institute.

The Anniversary Meeting was, by kind permission of the Board of Managers, held in the theatre of the Royal Institution on July 8th, 1886. The Chair was taken by Sir Robert Rawlinson, C.B., Vice-President of the Institute, by whom the Medals and Certificates awarded at the Exhibition at Leicester in 1885, were presented to the successful Exhibitors. Dr. T. Whiteside Hime, Medical Officer of Health, Bradford, read a paper on "Pasteur and Preventive Inoculation against Zymotic Diseases."

The Annual Congress was held in the city of York, under the Presidency of Sir Spencer Wells, Bart., and the meeting was most successful. The arrangements made by the Local Committee were complete and satisfactory: the attendance was considerably larger than usual; 150 Members were present, and 250 Tickets were taken by Associates of the Congress, giving a total attendance of 400. The papers read were above the average; a full report of the proceedings, with the papers and discussions, will be found in the forthcoming volume of the Transactions, Vol. VIII.

At the suggestion of the Local Committee a new feature was added to the work of the Congress, viz.: a Conference of Medical Officers of Health, held in connection with the Sanitary Science and Preventive Medicine Section. To this Conference Medical Officers from all parts of the kingdom were invited, and subjects which come specially within their province were brought forward and discussed.

The Fine Art and Industrial Buildings, in which the Exhibition was held, were among the most suitable that have ever been placed at the disposal of the Institute. Besides the Hall used for the Exhibits, Picture Galleries in the building were thrown open to the visitors.

A Model Dairy was fitted up, and demonstrations of butter making, &c., and Cookery Lectures were given each day in the Exhibition.

The Electric Light was used throughout the building, considerably enchancing the attractiveness of the Exhibition, which was visited by 30,000 persons during the twenty-three days that it was open. There were one hundred and thirty Exhibitors. The Judges awarded eleven Bronze Medals of the Institute, eleven Special Certificates, and fifty-six Certificates—the Special Certificates being awarded to articles which had received Medals at previous Exhibitions of the Institute. Forty-two Exhibits were deferred for further practical trial and testing, and it is expected that the result of these trials will be reported at the Anniversary Meeting in July, when the Medals and Certificates will be presented.

The Examinations, which the Council feel to be one of the most important branches of the work of the Institute, are rapidly progressing in public favour. Each year an increasing number of candidates present themselves for examination, and the value of the Certificate is more widely recognised. Many Sanitary Authorities in the provinces, and several in London, mention the Certificate of the Institute in advertising for new Inspectors.

At the Examination in June sixty Candidates presented themselves: ten for the Local Surveyor Certificate, and fifty for the Inspector of Nuisances Certificate. Five Candidates were certified to be competent, as regards their sanitary knowledge, to discharge the duties of Local Surveyor, and forty-four to discharge those of Inspector of Nuisances. At the Examination in November, sixty-four Candidates presented themselves: nine for the Local Surveyor

Certificate, and fifty-five for the Inspector of Nuisances Certificate Five Candidates were certified to be competent, as regards their sanitary knowledge, to discharge the duties of Local Surveyor, and forty-two to discharge those of Inspector of Nuisances. Unsuccessful Candidates are privileged to offer themselves a second time without further payment.

The Courses of Lectures for Sanitary Inspectors and others, arranged by the Parkes Museum, have proved very successful, and have been of great assistance to Candidates coming up for the Examinations of the Institute.

The publication of a selection of the works of Mr. John Simon, C.B., which the Council mentioned in their last Report, will, it is expected, take place in the current year.

The proposal to publish these writings has been much appreciated, as evidenced by the Subscription list, already verging on 500 names.

The Council have to report with much regret the death of the Hon. Francis G. Molyneux and Dr. J. Gilchrist, Fellows; Henry Masters, M. Ogle Tarbotton, M.INST.C.E., E. Carleton Tufnell, and Thomas Waller, Members; and Lt.-General S. J. Batten, Subscriber.

Since the last Annual Meeting there have been elected 1 Fellow, 13 Members, and 18 Associates. The roll of the Institute comprised at the close of 1886: 92 Fellows, 192 Members, 64 Associates, 11 Subscribers, and 29 Honorary Foreign Associates: making a total of 388.

The retiring members of Council are: H. Percy Boulnois, M.INST.C.E.; W. Collingridge, M.A., M.D.; H. H. Collins, F.R.I.B.A.; Director-Gen. Sir Thomas Crawford, K.C.B., M.D.; R. B. Grantham, M.INST.C.E.; and M. Ogle Tarbotton, M.INST.C.E. (deceased).

The following gentlemen are nominated by the Council for election at the Annual Meeting to fill the vacancies thus created; Ernest Carritt, A.R.I.B.A.; C. E. Cassal, F.C.S., F.I.C.; W. Horton Ellis, F.R.MET.SOC.; Inspector-Gen. R. Lawson; Louis Parkes, M.D.; Edward Pritchard, M.INST.C.E.

Lectures upon Sanitary subjects have been given in the Parkes Museum during the year, and the Members of the Institute have had the privilege of attending these as well as of using the Library of the Museum, which contains a large number of works on Sanitary and allied subjects.

The Council referred in their last Report to the question of amalgamating with the Parkes Museum, which has been for some time under consideration. The proposed amalgamation has been fully approved by both Societies, and a joint petition has been presented to Her Majesty praying for the grant of a Royal Charter of Incorporation under the title of the SANITARY INSTITUTE. This petition was very influentially supported, and is now under the consideration of the Privy Council.

The Council have accepted an invitation to hold the ensuing Annual Congress and Exhibition in Bolton, a very thriving and energetic town. They trust that the visit of the Institute there will prove very successful, and result in much benefit to the inhabitants and locality of Bolton.

By order,

E. WHITE WALLIS,
Secretary.

74A, MARGARET STREET,
26th May, 1887.

SANITARY INSTITUTE OF GREAT BRITAIN.

Abstract of Cash Receipts and Payments for the Year ending December 31st, 1886.

	£ s. d.	£ s. d.
To Balance at Bank, January 1st		571 15 9
" Admission Fees	48 6 0	
" Life Compositions...	110 5 0	
		158 11 0
		228 18 0
" Annual Subscriptions	21 8 3	
" Transactions and other Publications ...	124 13 6	
" Congress Sale of Tickets... ...	264 12 0	
		410 13 9
		411 18 6
" Dr. Farr's Works		1 4 0
" Mr. Simon's Works		2 7 7
" Furniture		300 0 0
" Transfer from Exhibition Account ...		
		£2085 8 7

	£ s. d.	£ s. d.
By Rent and Taxes		65 12 6
" Salaries and Wages		285 2 10
" Postage, Telegrams, and Carriage ...		39 10 7
" Incidental Expenses		44 15 7
" Stationery and Printing		116 10 2
" Medals and Certificates		23 15 0
" Advertising		0 12 0
		575 18 8
" Transactions		278 13 1
" Congress		305 2 9
" Examinations		219 3 1
		802 18 11
		440 16 10
		54 6 2
		9 11 10
" Balance at Bank, December 31st ...		201 16 2
		£2085 8 7

EXHIBITION ACCOUNT.

	£ s. d.	£ s. d.
To Balance, January 1st	12 17 11	
" Receipts	1210 6 0	
		£1223 3 11
By Expenditure		828 2 4
" Transfer to General Account		300 0 0
" Balance, December 31st		95 1 7
		£1223 3 11

MAGNUS OHREN,
EDWARD C. ROBINS, } *Auditors.*

Audited and confirmed,

May 21st, 1887.

ADDRESS

By Captain Douglas Galton, R.E., C.B., D.C.L., LL.D., F.R.S.

CHAIRMAN OF COUNCIL.

Read at the Annual Meeting, May 26th, 1887.

In accordance with the usual custom, it now falls to me to give you a short address. I would in the first place congratulate you on the present position of the Institute.

We had undoubtedly a most successful meeting at York. I say successful, because the papers or contributions were all of a high level, and the interest excited by the meeting extended far beyond the limits of the city and county in which it was held; and I feel sure that although Bolton is not so attractive a city, yet that, under the Presidency of Mr. Sclater-Booth, we shall have a not less important meeting this year. It is not however only in the case of our meetings that our efforts have met with success. Our examinations in Sanitary Science have attained a considerable development. Our certificates are beginning to be recognised as giving their holders a certain claim to candidature in appointments under sanitary authorities. The result has been that the number of candidates has steadily increased.

At the examination in June, 1886, sixty candidates presented themselves: ten for certificates as Local Surveyors, and fifty for certificates as Inspectors of Nuisances. At the examination in November, sixty-four candidates presented themselves: nine for Local Surveyors, and fifty-five for Inspectors of Nuisances. At the examination to be held next week, there are eighty-one candidates, of whom ten are for the Surveyor's Certificate, and seventy-one for Sanitary Inspector's. The fact of this progress in the number of our candidates is an index of the appreciation in which our examinations are held, as well as an evidence that these examinations supply a definite want; and so long as we conduct them with care, and preserve the safeguards by which they are now surrounded, we shall maintain their high character.

It will be in your recollection that we made last year an effort to supplement the examinations by inducing the Parkes Museum to organise preliminary lectures on the subjects included in our syllabus. Those lectures were well attended, and a further course was organised in advance of the examinations now about to be held.

I look upon it as a most important adjunct to the educational movement in sanitary knowledge, of which both the Sanitary Institute and the Parkes Museum are the expression, that these opportunities for instruction as a preliminary to our examinations should be afforded; and the proposed, I trust approaching, union of the Parkes Museum with the Sanitary Institute will place in a very prominent light the almost wholly educational character of our Institute.

When we look at the results which we have achieved with our Examinations, our Congresses, and our Exhibitions, with their organised system of awards, we may well feel satisfied that the efforts which we have been making during the ten years of our existence, have tended to promote sanitary education and to raise the standard of sanitary knowledge throughout the country. Whilst however we have been endeavouring to stimulate sanitary knowledge in this country, we have not been unmindful of the desirability of keeping alive the recollection of the work done by the earlier pioneers of that science.

The basis of modern sanitary science rests on the development of vital statistics, and we owe the present state of vital statistics in this country to Dr. Farr.

Professor Gairdner said of him, in his address at Glasgow, that he had "done for the vital statistics of England almost what Harvey did for physiology, or Lavoisier for chemistry. He found the facts of this science in a state of almost hopeless and aimless confusion. He has not only added immensely to the number and value of these facts but has brought into them light, harmony, order, and for the first time in the history of the science has introduced a determinate method and an approach to scientific exactness. It has been the great and enduring merit of Dr. Farr (originally a modest country practitioner of the Company of the Apothecaries) to build up a body of doctrine on vital statistics, not only unequalled, but unapproached in any other country."

Dr. Farr may thus be said to have laid the foundation upon which true sanitary science must be built up; because it is with the aid of, and the light thrown by, statistics, that the sanitarian is enabled to guide himself with accuracy through the maze of facts which every sanitary problem offers.

We induced Mr. Noel A. Humphreys to edit the vital

statistics of Dr. Farr, and the volume which he has produced possesses a very high value as a work of reference. I cannot but think that ere long we shall have cause to regret that we did not publish a larger edition.

The collection of vital statistics by the Government was coincident with the commencement of the Queen's reign. Before that time Dr. Southwood Smith as physician of the Fever Hospital at King's Cross had gathered facts from the patients who came to the Hospital, which proved that there were large classes of disease which he described as preventible diseases, the recurrence of which, by the adoption of sanitary means, would be brought under control.

But one of the early fruits of the system of vital statistics commenced under the supervision of Dr. Farr was the report of the Poor Law Commission on the condition of the working classes in 1842, which was drawn up by Mr. Edwin Chadwick, C.B. It is a remarkable tribute to the foresight of Mr. Chadwick that during the last half century almost all the sanitary principles laid down in that report have been recognised by the Legislature as necessary to the welfare of the community, and have become matters of ordinary practice. It is understood that Dr. Richardson is editing Mr. Chadwick's principal reports and papers.

Another of the principal workers in the sanitary field was Mr. John Simon, whose series of valuable reports forms a text book of sanitary science.

The Sanitary Institute has followed up the attempt to make generally accessible the knowledge of that branch of sanitary science represented by Dr. Farr's works, by arranging to have many of the more important reports of Mr. John Simon edited under his own general supervision; and this task has been committed to Dr. Seaton, who is at present engaged upon it.

Mr. Simon's reports commence with the period which followed the passing of what may be termed the first general Sanitary Act in 1848.

Amongst those who have been instrumental in spreading sanitary knowledge Mr. Simon stands out prëeminent. His position at the Privy Council Office afforded him vast opportunities; and in addition to the fact of the reports being full of matter which is of high value to the scientist, Mr. Simon's originality of thought, his power of reasoning, his clearness of expression, and his elegance of language,—all contributed to make them sought after by a large circle of readers.

If I now call your attention to some portions of Mr. Simon's reports, it is that you may measure in some degree the progress which the Nation has made in its methods of living since those

days when every one was allowed, in respect of his surroundings, to do much as he liked; and thus that you may be able to gauge the great influence which the combined efforts of Farr, Chadwick, Southwood Smith, Rawlinson, Simon, Sutherland, and some others have exercised on the Nation.

Mr. Simon's City of London reports were commenced in 1849. In his first report he says:—

"From such information as I possess, I may venture to speak of imperfect house-drainage as having been a general evil in all the poorer districts of the City. So far as I can calculate, some thousands of houses within the City still have cesspools connected with them. It requires little medical knowledge to understand that animals will scarcely thrive in an atmosphere of their own decomposing excrements; yet such, strictly and literally speaking, is the air which a very large proportion of the inhabitants of the City are condemned to breathe. In a very large number of cases the cesspool lies actually withing the four walls of the inhabited house; the latter reared over it, as a bell glass over the beak of a retort, receiving and sucking up incessantly the unspeakable abomination of its volatile contents. In some such instances, where the basement story of the house is tenanted, the cesspool lies—perhaps merely boarded over—close beneath the feet of a family of human beings, whom it surrounds uninterruptedly, whether they wake or sleep, with its fœtid pollution and poison. Now here is a removable cause of death."

"The cesspool nuisance has been the slow growth of other less enlightened ages, not in the City merely, but in the whole metropolis, and in all other towns in England. The extreme injury which it inflicts on the health of the population, and the vital necessity of abating that injury, are points which only began to claim attention in this country about ten years ago, and which have since but very slowly been forcing their way (chiefly through the indomitable zeal and perseverance of Mr. Chadwick,) into that share of notice which they deserve. House-drainage with effective water-supply are the remedies which can alone avail; and it is only during the present year that authority to enforce these measures has been vested by the Legislature in any public bodies whatsoever."

These paragraphs only exhibit one of the evil conditions which his reports show were so largely prevalent at that time, and which furnished the graphic name of filth diseases as applicable to that class of diseases to which the conditions gave rise. It was a condition of things from which we are now happily, comparatively speaking, free in England, but which undoubtedly still prevails largely in many parts of the continent, and certainly in large portions of India.

Mr. Simon's reports raise questions of still deeper import. He shows the degradation of the population in the crowded districts of the City, and he puts forward a doctrine which has not even yet received the full degree of acceptance which it should command in a christian country.

"If there be citizens so destitute, that they can afford to live only where they must straightway die—renting the twentieth straw-heap in some lightless fever-bin, or squatting amid rotten soakage, or breathing from the cesspool and the sewer; so destitute that they can buy no water—that milk and bread must be impoverished to meet their means of purchase—that the drugs sold them for sickness must be rubbish or poison; surely no civilized community dare avert itself from the care of this abject orphanage.

"If such and such conditions of food or dwelling are absolutely inconsistent with healthy life, what more final test of pauperism can there be, or what clearer right to public succour, than that the subject's pecuniary means fall short of providing him other conditions than those? It may be that competition has screwed down the rate of wages below what will purchase indispensable food and wholesome lodgment.

"All labour below that mark is masked pauperism. Whatever the employer saves is gained at the public expense. When, under such circumstances, the labourer or his wife or child spends an occasional month or two in the hospital, that some fever infection may work itself out, or that the impending loss of an eye or a limb may be averted by animal food; or when he gets various aid from his Board of Guardians, in all sorts of preventible illness, and eventually for the expenses of interment, it is the public that, too late for the man's health or independence, pays the arrears of wage which should have hindered this suffering and sorrow.

"Probably on no point of political economy is there more general concurrence of opinion than against any legislative interference with the price of labour. But I would venture to submit, for the consideration of abler judges than myself, that before wages can safely be left to find their own level in the struggles of an unrestricted competition, the law should be rendered absolute and available in safeguards for the ignorant poor—first, against those deteriorations of staple food which enable the retailer to disguise starvation to his customers by apparent cheapenings of bulk; secondly, against those conditions of lodgment which are inconsistent with decency and health."

Since these reports were written, the Legislature has made great advances in the direction of preventing the adulteration

of food; and the question of the housing of the working classes has received considerable attention. But we have not touched upon some of the more important questions here raised by Mr. Simon, viz., how, in our densely crowded towns, is our population to obtain the wages necessary for decent existence?

The principle upon which the progress which is being made in this respect may be said to be founded is that a community owes to its members the duty of removing from its midst preventible causes of disease, both in the interests of the richer as well as of the poorer members, because the prevalence of disease-causes affects all classes of the community in a greater or lesser degree.

This is the practical doctrine which underlies all Mr. Simon's reports. Their whole argument is a protest against the doctrine of "*laissez-faire*," which had emanated from the school of political economists in the earlier part of the century. And we are daily becoming more and more alive to the fact that this doctrine of "*laissez-faire*" is incompatible with the healthy existence of large communities. We are continually making progress in this direction, but very much remains to be done. In drainage, water supply, and the removal of refuse, the individual has been long compelled to conform to the regulations laid down by the community.

We have made in this direction considerable improvements on what was done when Mr. Simon's earliest reports were written; but no one will contend that our arrangements are as yet thoroughly satisfactory.

Take the case only of dust removal. Why, on my way here to-day, I passed a man loading ashes and decaying refuse from a dusthole into an open cart by means of a half worn-out open basket. Much of the refuse falls on the street, and much of the dust and refuse is carried by the wind into the faces of the passers-by.

We have not yet in dense aggregations of population taken any effectual means to prevent the smoke from our fires both polluting the air and materially diminishing the daylight, which is itself a necessary adjunct of health; and in this huge metropolis in which a population larger than that of some kingdoms is assembled on a comparatively small area, the evils of the use of fires which are not arranged to prevent smoke become daily more and more apparent.

Any one who will take the trouble to look will see that the smoke is no imaginary evil. The early morning may be hazy, but there is plenty of light; as soon, however, as the domestic fires are lighted, the haze often becomes a dark fog, or a dense canopy almost impenetrable to sunlight; and on many

days in the winter and spring the daylight is obstructed for hours.

The object of the sanitary Acts has been to provide for us in our houses and our streets a dry subsoil, fresh air and pure water. These are what may be termed the engineering aspects of sanitary knowledge. But Mr. Simon's reports are not confined to this side of sanitary knowledge. They deal with wider questions, and are so replete with careful reasoning on the occult causes of the propagation of disease, that it would be impossible here to do more than make a brief allusion to them.

His paper on the history of the Small-pox and system of vaccination is a complete repertory of information upon that subject, and a complete answer to those who have objected to vaccination. He shows that one of the most loathsome diseases, and one of the direst scourges that ever afflicted humanity, is controlled exactly in proportion as the operation of vaccination is well and thoroughly performed among the population. That those nations where it is compulsory on the whole population, and where the law is enforced with the greatest care and precision, that there the disease is almost obliterated. That in exact proportion to this care and precision in various communities, is the amount of immunity.

The progress of sanitary knowledge based upon the accurate record of facts, is leading us to see that members of the community must be restrained from freedom to propagate those diseases which are so highly infectious and contagious.

In this connection Mr. Michael, in a very interesting paper which he read some years ago to the Sanitary Institute, lays down the principles which he considers form the line of demarcation between what should, and what should not be made compulsory, where injury to the public is the result of neglect of sanitary laws.

He says: "1st, there should be certainty as to the cause of the injury; 2nd, certainty as to the efficiency of the proposed remedy; and 3rd, that the remedy is productive of no evil effects, and may advantageously be adopted."

Now this rule would entirely apply to the isolation of cases of infectious disease in special hospitals under carefully considered conditions, where the treatment of cases can be best carried on, and the subsequent convalescents placed under the most favourable conditions for perfect recovery. This is a necessity primarily in the interests of the healthy as against the sick, but with an equal amount of benefit to the sufferers themselves, and to their relatives and friends.

What is required to make these arrangements effectual to

prevent the spread of small-pox and other infectious diseases, but small-pox especially, is the immediate isolation of the patient when the disease first shows itself. Certain conditions are necessary to secure this. The first is, that every case of infectious disease should be promptly notified to the authorities; secondly, that the patient should be at once isolated; thirdly, that those who have been in immediate contact with the patient should be retained for a period under observation; fourthly, that the premises where the case occurred should be cleansed and disinfected, and any sanitary defects in them should be remedied.

In the enforcement of these conditions there should be no distinction between rich and poor, pauper and non-pauper cases, except the distinction between persons who can and persons who cannot be isolated at their homes, or in some place approved by the proper authorities. In default of such isolation, the authorities should be empowered and bound to remove to the hospital any patient capable of removal without risk to life or aggravation of the disease.

The notification of disease, the isolation of all patients whether rich or poor, the careful observation of all those who have been in contact with the patient, the disinfection of the house in which the patient resided at the time of his attack, and the removal of any sanitary defects which may be found in the house, are all links in one chain; and until these measures are made compulsory in the metropolis, and in the country generally, we are neglecting a powerful means of preventing the spread of small-pox and other infectious diseases.

One of the links of this chain which at present is not always considered, is the sanitary condition of the houses in which the cases occurred. The occurrence of a case of infectious disease in any house should be in itself taken as an index of the possibility of defects existing, and should be *prima facie* ground for a thorough examination of the premises and the surroundings by skilled persons. Because we should always feel that any arrangements which we may make for preventing the spread of infectious disease by isolation, are but aids or adjuncts to the effectual sanitation of the towns and houses; they are only wanted because our houses and towns are not in that good sanitary condition which it should always be our primary object to attain to. Indeed, many sanitarians have feared that by giving much prominence to checking the spread of disease by means of isolation, we divert attention from the real causes, namely, the insanitary state of dwellings and towns, which are the favouring conditions under which the propagation of these preventible diseases is encouraged; and we thus

weaken the efforts which the community ought to make to eradicate them.

It is possible that some years ago, when the sanitary education of the people was very far behind what it now is, it might have been so; but now such results need not perhaps be so much feared; but it should be made the duty of that authority which is charged with receiving and dealing with cases of infectious disease in a town, also to investigate what are, in each instance, the conditions under which the patient was living at the time of his attack.

I trust that you will not think these brief remarks, which are the outcome of reflection upon a few of the very interesting questions raised in Mr. Simon's reports, are out of place here. I feel that any time is well spent which is devoted to calling attention to those bases of sanitation which have been laid down by the pioneers of Sanitary improvement; and I should be glad if my present remarks should have the effect of drawing general attention to the valuable summary of Mr. Simon's reports, which under the very able editorship of Dr. Seaton, will soon be ready for issue.

ON THE SHORTCOMINGS OF SOME MODERN SANITARY METHODS.

ADDRESS BY G. V. POORE, M.D., F.R.C.P.

Anniversary Meeting, July 14th, 1887.

I HAVE been for some years so strongly impressed with the shortcomings of one of the chief methods of modern sanitation that I felt bound, when the Council of the Sanitary Institute did me the great honour of requesting me to deliver the annual address, to choose for my subject that which was uppermost in my mind.

The chief aim of sanitarians has ever been, and ever will be, the securing for the masses of the people the two chief necessities of life—pure air to breathe, pure water to drink. Whether or not we are able to secure these two necessities depends very largely upon the method which we adopt for the treatment of putrescible refuse, and it is on this point, and on the modern fashion of mixing putrescible refuse with water, that I propose to address you.

It may be well to remind you that all dead organic matter is putrescible, and, when I speak of putrescible matter, I mean all organic matter inclusive of excrement.

Nature moves in a circle, animals feed on each other and on vegetables, vegetables feed on the dead bodies of animals and vegetables, and on the solid and gaseous excrements of animals. Animal and vegetable life are complementary, and mutually support each other. This is a law of nature, and when I make this assertion I feel I run no risk whatever of being contradicted.

The laws of nature are inexorable; *i.e.*, they are not to be set aside by human prayers—not even by that best of all prayers, labour. Those who disobey the laws of nature or who enter into a contest with her are sure to be worsted in the end. If we fight with nature we court calamity.

I have elsewhere compared those who fight with nature to Sisyphus who according to the old mythology was condemned

in the lower world to a never-ending contest with the force of gravity—

> With many a weary sigh and many a groan,
> Up the high hill he heaves a huge round stone;
> The huge round stone resulting with a bound,
> Thunders impetuous down, and smokes along the ground.

By means of great expenditure of time and money, we may for a period wage with nature a war which may be apparently successful. The war can never be really successful, it will never terminate, nature in the end will assert her eternal sway, and crushing defeat must be our lot.

As the inevitable destiny of putrescible matter is to become the food of vegetables, a destiny which we can delay at the most only for a brief period, our proper course in dealing with it is clearly not to attempt to prevent or even to delay the inevitable. Such a course is to disobey the laws of nature, to fight with her and court ultimate defeat. Our wiser plan is to help nature in her work, and thus win her smiles.

It has been the wise custom in all ages of the world to dispose of putrescible matter by burial in the earth. Dead bodies have in all ages been buried, and the greatest of all lawgivers and sanitarians, Moses, whose likeness rightly takes the place of honour in this room, gave most explicit directions that excremental matters should be treated in the same way.

This is a not unimportant fact, and although we do not in this country follow the whole of the Mosaic law, nevertheless that law is so pregnant with marvellous wisdom that we ought not to discard any item of it without first questioning ourselves most strictly as to our reasonableness in so doing. The latest advances of modern science seem to show that in this particular Moses was absolutely in the right.

It has been shown, I think, conclusively that the decomposition of organic matter, whether in the earth, air or water, is brought about by minute fungoid organisms, the growth of which has the effect of resolving the highly complex organic compounds into soluble salts or gaseous bodies, which can be absorbed by the roots of plants.

Now when putrescible matter is buried in the earth it undergoes decomposition without the occurrence of putrefaction—that process which is at once offensive to the senses and dangerous to health. This is effected by means of mould fungi, which produce oxidation of the organic bodies. If sufficient air has access to the pores of the soil, and if sufficient moisture be present, the nitrogen takes oxygen to form nitric acid, which, combining with the bases, forms soluble nitrates, and the

carbon also combining with the oxygen forms carbonic acid which, combining with the bases, forms carbonates.

The best account which I have been able to find of the active organisms which are ever present in the soil, is in a paper by Professor Wollny,* of Munich, which was brought to my knowledge by my friend, Dr. E. F. Willoughby. These organisms are so incalculably numerous that their activity must be exceedingly widespread. Koch found enormous quantities, even in winter, in the soil not only of crowded places like Berlin, but in that also of remote fields. At the observatory of Mont Souris 750,000 were found in a gram of earth, and at Genevilliers from 850 to 900,000.

If the action of the microbes be checked by antiseptics, the vapour of chloroform or by heat (100°c), the chemical changes in the earth cease.

That the formation of nitrates and carbonic acid from organic matter in earth to which air has access is due to microbes has been proved by direct experiment. When however organic matter is mixed with earth, and air is admitted in insufficient quantity or entirely excluded, the decomposition is of another kind; and besides small quantities of carbonic acid and carburetted hydrogen, there is formed water, ammonia, free nitrogen, and a great quantity of a black carbonaceous peat-like matter (the so-called sour humus).

Schlösing found that the nitric acid in the soil disappeared when the air was replaced by nitrogen.

The kind of organism seems to vary with circumstances. As long as air is freely admitted, the mould-fungi (schimmelpilze) preponderate; and when air is excluded, the schizomycetes (spaltpilze) increase.

The formation of nitric acid in organic earth mixtures depends on the amount of oxygen which is present in the air admitted. Thus Schlösing found by experiment that the formation of nitric acid varies as under:—

Oxygen	1·5%	6%	11%	16%	21%
Nitric Acid	45·7 m.g.	95·7	132·5	246·6	162·6

The nitrification which took place with a limited supply of oxygen was due probably to the air already mixed with the earth before the experiment began.

Miller and Boussingault have shown that no nitrification takes place in thoroughly soaked earth to which little air has access, and that when oxygen is absent the nitrates in the earth are

*"Ueber die Thätigkeit niederer Organismen im Boden." Deutche Vierteljahrsschrift für Offentliche Gesundheitspflege, Vol. 15, 1883, p. 705.

reduced. The formation of carbonic acid also depends upon the admission of air (containing free oxygen), but some carbonic acid is formed even though all air be excluded.

Oxygen in air	Pure N	6%	11%	18%	21%
Carbonic acid	9·3 m.g.	15·9	16	16·6	16

Nitrification is assisted by a moderate amount of moisture. It attains its maximum when the moisture reaches 33 per cent., and above and below this the process of nitrification and formation of carbonic acid is hindered.

Temperature has a great influence on oxidation in the earth. It reaches a maximum, with a temperature of about 50° C., (120° F.) and stops at 55°.

Oxidation goes on most quickly in the dark.

Thus, oxidation depends not only on the presence of the organisms, but also on the presence of other factors, such as suitable aeration, suitable moisture, suitable temperature.

These factors may all be suitable, or some may suit and others may not suit the oxidation process.

The decomposition of organic matter in the soil is governed by that factor which is at its minimum.

The process of decomposition is much influenced by the physical condition of the soil, as, *e.g.*—

(*a.*) Permeability for air and water.
(*b.*) Nature and permeability of subsoil.
(*c.*) Slope.
(*d.*) Aspect.
(*e.*) Warmth dependent on aspect, mineral composition, colour and moisture and nature of the crop. Barren soils are warm, while those covered with green crops are cool.

That the variations of the ground water have a bearing on the oxidation processes cannot be doubted, when we reflect that the soaking of the upper layers of the earth is much influenced by the height of the ground water. When all the layers of earth are soaked, putrefactive processes, through the medium of Schizomycetes, take place. When the ground water falls, and the air again enters the pores of the soil, the growth of those organisms is favoured, which assist in the oxidation of the soil.

All changes which organic matter undergoes in the earth are thus seen to be brought about, almost exclusively, by the life of lower organisms the activity of which is ruled by the same natural laws which govern the growth of higher plants.

There can be no better illustration of the true economy of nature than this action of the microbes in the soil on the conversion of organic matter into soluble salts and gases which serve as food for plants.

The growth of the microbes depends upon the concurrence of those conditions which, by experience, we all know to be favourable to the growth of higher plants. There must be a good supply of free oxygen, sufficient, but not too much, moisture and a summer temperature. In well-tilled ground, broken up so as to admit air to its pores, and in a "fine growing season," in which sunshine alternates with showers, this process of oxidation is at its maximum. The microbes are active beneath the surface manufacturing plant food from organic matter, and the favourable conditions above soil and below cause a vigorous growth of crops.

When, on the other hand, the weather is unfavourable, and when in consequence of excessive cold, excessive drought or excessive wet, crops are not developed as they should be, the microbial life is also checked, and the change of the organic matter is delayed, and it is stored up for future use in more favorable seasons. This is the explanation apparently of the fact well known to farmers, that the effect of organic manures is more permanent than that of the so-called artificial manures, which at present are so much in vogue. The organic manure remains entangled in the soil and is not readily washed out of it in winter when the temperature is low, or even in unpropitious summers. It cannot be washed out until microbial growth has changed it into soluble salts and when this change takes place, which it does in "good" weather, the roots of the growing plants seize hold of the ever-forming soluble salts and appropriate them to their own use. In fact the farmer who uses organic manures from the farm-yard or elsewhere, need trouble himself very little with agricultural chemistry or experiment.

He may feel certain that if he buries his organic manure *directly it is produced* it will not be wasted. It will not give off ammonia to the air, nor will the juices be washed away by rain to the same extent as when it is left above ground to be a nuisance. There seems to be no doubt whatever that all heaps of manurial matter which give off ammonia and other gases to poison the air, and perhaps do more serious mischief which we "know not of," are allowing valuable matter to escape, which ought to be undergoing oxidation in the earth. There can be no doubt whatever that to the agriculturist stink means waste, and it is to be hoped that when the bucolic mind has imbibed this great and important truth, the country will be more evenly pleasant than it is.

The reason why farmers allow putrescible matter to fester in heaps appears to be—

(1). That the matter has to wait until land is clear and circumstances permit of its being dragged to the fields; and (2)

that when the matter is thoroughly rotten and most offensive, a *more rapid and visible* result is produced, notwithstanding that the total result is probably less than if it had been applied to the ground at once. It is certain that putrescible matter intended for manure must waste more above ground than when buried immediately beneath it. Rich farmers are now building sheds over their yards to prevent the access of rain to the manure, and are providing tanks for the reception of liquid which drains away. This involves a very great expense, and it is at least doubtful whether the result is better than that got by the immediate application of such matters to the soil—a process which involves no extra expenditure of any kind—a most important matter, because the only acceptable test of good husbandry is the balance sheet.

Mr. Warington, F.R.S., in his valuable little book on "The Chemistry of the Farm," says, "The most complete return to the land would be accomplished by manuring it with the excrements of the men and animals consuming the crops" (p. 28); and again, "Farmyard manure is a 'general' manure; that is, it supplies all the essential elements of plant food. * * The effect of farmyard manure is spread over a considerable number of years, its nitrogen being chiefly present not as ammonia, but in the form of carbonaceous compounds, which decompose but slowly in the soil."

The immediate return is often less than when artificial manure, consisting of soluble nitrates and phosphates is used, but the important point seems to be that the return is tolerably sure to come in the long run.

The late Professor Voelcker, in the article, "manure," in the "Encyclopædia Britannica," gives an interesting table of the experiments of Sir John Lawes and Dr. Gilbert, spreading over a period of 24 years, in which is shown the effect of different manures on crops. The most successful results with artificial manure were got by applying nearly 1,400 lbs. weight per acre of mixed ammonia salts, superphosphate and sulphates (potash, soda, and magnesia). With this manure there was an average production of 37½ bushels of wheat, weighing on an average 59 lbs. per bushel, and multiplying these two figures together we may say that the production of wheat averaged 2,212·5 lbs. The production of barley averaged 41½ bushels, weighing 53⅜ lbs., and multiplying these figures we may say that the average production was 2,588 lbs. Where the land was manured with 14 tons of farmyard manure the average production of wheat was 35¼ bushels, weighing 60 lbs., giving a figure of 2,115 lbs., and of barley, 48¾ bushels, weighing 54⅜ lbs., giving a figure of 2,650 lbs.

This farmyard manure, when used for wheat growing, gave a yield of 97 lbs. less than when the best artificial manure was used; and when used for barley growing it gave 62 lbs. more than when artificial manure was used. These figures are certainly not such as should discourage us in the use of farmyard manure, especially when we remember that the average agriculturist is not likely to apply his artificial manures with the knowledge and judgment of Messrs. Lawes and Gilbert; and that in the use of farmyard manure it is not easy for him to go very wrong. Again, farmyard manure is stuff which *must* be used, while chemicals are things which *must* be bought, and need to be analysed when bought.

It is a great mistake to suppose that farming is in any way comparable to a chemical experiment. In experiments conducted in the laboratory the chemist is able to control *all* the conditions of the experiment, but in farming the condition which above all others influences the result, viz., the weather, cannot be controlled.

When chemical manures are used with judgment and applied at the right moment, and when the weather is favourable, there is no doubt that the result is often surprising and gratifying. When however the weather is unfavourable, when the drought is so great that the chemicals cannot be dissolved, or when the rain is so heavy that they are washed out of the soil, the result is not encouraging. If organic manures are used, they do not waste in bad seasons, and much remains in the ground for next year's crop. The farmer however who applies chemicals in a bad season, gets neither crop nor residuum of manure for next year. Mr. Warington says that "farmers have a prejudice in favour of the latter (*i.e.*, organic) manures, but it is clear that the quickest return for capital invested is afforded by the former class" (*i.e.*, inorganic).

Surely we have no right to blame the farmers for their prejudice, which seems to be in all respects reasonable. The doctrine has obtained in this country of late years that it is good economy to waste all our home-grown organic manure, and to import chemicals from South America for the purposes of agriculture. This is a strange doctrine; but as most of our farmers are now too near bankruptcy to pursue this course, we may hope that ere long they will begin to clamour for that which we now waste so wickedly.

One more word before I bring my remarks on farming to a close, remarks for which I make no apology, for I feel sure you must already recognise their bearing on the subject of sanitation.

The remark I have to make is this, that in the hands of Lawes and Gilbert farmyard manure gave better results with

barley than with wheat. May not the fact that farm animals are largely fed with barley-meal, have something to do with this. There are experiments which show that minimal ingredients in manures are not without effects which are often surprising. There are *a priori* grounds for thinking that the best manure for barley must be the excrement of a barley-eating animal, for in that excrement must be all that is necessary for barley. I wish some agriculturist would make the experiment of growing wheat with the excrement of a wheat-eating or bread-eating animal. As a gardener I have grown potatoes with the excrement of a potato-eating animal, and certainly the result has been most encouraging.

I have been obliged to draw my illustrations as to the practical result of burying organic matter from the agricultural employment of farmyard manure, because facts based upon exact experiments with the organic refuse of our towns is not forthcoming.

What I want to insist upon is this, that the proper destiny of organic refuse is immediate burial just below the surface of the soil.

Most of the shortcomings of modern sanitary methods are due to the fact that in our dealing with organic refuse we commit a scientific error, *i.e.*, we pursue a course which is in opposition to natural law.

This error consists in mixing organic refuse with water.

When organic refuse is mixed with water, it undergoes changes which differ widely from the changes which it undergoes when mixed with earth.

According to Wollny whose paper I have quoted previously, the process of oxidation of organic matter and the formation of nitrate takes place most readily when a moderate amount of moisture is present. The most favourable amount is about 33 per cent., and if the moisture rise above or sink below this amount, the process of nitrification and the formation of carbonic acid is hindered. When water is in excess the amount of free oxygen is insufficient to favour the growth of mould fungi, the schizomycetes (Bacteria and Micrococci) are formed, and in place of oxidation, putrefaction takes place with the formation of ammonia, free nitrogen, carbonic acid, and carburetted hydrogen. Under these unfavourable circumstances it is possible that the nitrates which may have been formed may be again reduced.

This process of de-oxidation takes place in mixtures of putrescible matter with water, and takes place also, it is said, in soil which is thoroughly soaked with sewage (*i.e.*, putrescible matter mixed with water). In the face of these facts it is not to be

wondered at that "sewage farming," which is farming under acknowledged difficulties, has not proved a commercial success. We must indeed be in doubt whether, when the circumstances are more than usually unfavourable, it exercises any very great purifying action upon the putrescible mixture. In the treatment of putrescible refuse, so that it shall not be a danger or annoyance, what we have to aim at is nitrification rather than putrefaction, and it is certain that by mixing with water putrefaction is encouraged and nitrification delayed.

It certainly seems to be almost incontestable that the proper course to pursue with regard to organic refuse—putrescible matter—is the very reverse of that which we do pursue. We clearly ought to encourage oxidation, and make putrefaction impossible.

Putrefaction is certainly a great cause of ill health. It was the putrefaction of wounds (now happily almost unknown) which converted our hospitals into something little better than charnel houses. It is the putrefaction of organic refuse mixed with water in cesspools and sewers that causes that long list of ailments which we ascribe to the inhalation of "sewer air."

The opinion is held by many that the dejecta of typhoid patients and cholera patients do not become dangerous to others until putrefaction has set in, and such an acute observer as was the late Dr. Murchison held the opinion that common putrefactive changes taking place in dejecta were a sufficient cause of typhoid, independently of the admixture of any specific poison.

The putrefaction of organic refuse, when mixed with water, has I think been the chief cause of the development of modern sanitary "progress." Our forefathers were not given to this method of treating putrescible matter. House-slops trickled along open gutters, and excremental matters were deposited in dry pits. At the beginning of this century the water-closet came into use.

Mr. W. Haywood, quoted by Dr. Farr, says, "Water-closets were invented about 1813, and became general in the better class of houses about 1828-33. The custom at first obtained of building cesspools having overflow drains put below their doming, by which means the solid matters were retained, and the supernatant liquid only ran off.

"In the year 1849, what may be said to be an organic change in the system took place. In 1848 the City Commission of Sewers obtained its Act for sanitary purposes, which became operative on January 1st, 1849, and then for the first time was discharge into the sewers legalised. Previously a penalty might have been enforced for such a usage of them, but henceforth within the City of London those incurred a penalty who

failed, upon notice, to construct the drainage of premises in such a manner as not to discharge all waste waters *and fæcal matters directly into the public sewers* [*i.e.*, directly into the sources of water supply] of which the full utility was therefore for the first time recognised by statute. This Act was speedily followed by others for the remaining area of the metropolis and for the entire country."

"It will be noticed," says Dr. Farr, "that the deaths from cholera and diarrhœa increased in London in 1842, increased still more in 1846, when the potatoe crop was blighted, and in 1849 culminated in the epidemic of cholera.

Dr. Farr says further, "a system of sewerage is the necessary complement of a water-supply."

"Almost coincidently with the first appearance of epidemic cholera, and with the striking increase of diarrhœa in England, was the introduction into general use of the water-closet system, which had the advantage of carrying night soil out of the houses, but the incidental and not necessary disadvantage of discharging it into the rivers from which the water-supply was drawn."

Mortality per 1000 from diarrhœa in London (Dr. Farr):—

1838	·215	1853	1·011
1839	·201	1854	1·257
1840	·238	1855	·804
1841	·238	1856	·866
1842	·353	1857	1·181
1843	·410	1858	·759
1844	·340	1859	1·211
1845	·397	1860	·496
1846	·997	1861	·928
1847	·898	1862	·607
1848	·853	1863	·821
1849	1·705	1864	·981
1850	·813	1865	1·206
1851	1·085	1866	1·306
1852	·983	1871-80—Dr. Ogle	·940

Thus in the decade 1871–80, 33,168 persons died of diarrhœa in London, the death-rate from this cause being ·94

If the death-rate of 1838 (·215) had obtained in the decade 1871–80, the deaths from this cause would have numbered only 7,600, and there would have been a saving of 25,568 lives.

Since the introduction of the water closet, and I believe as a direct consequence of it, we have had four severe epidemics of cholera, a disease not previously known, and enteric or typhoid

fever, previously almost or quite unrecognised, has risen to the place of first importance among fevers in this country.

The evils which have arisen from cesspools and sewers has caused an enormous amount of attention to be devoted to what are known as "sanitary appliances," sewer constructions, &c., and so great and so well recognised are the evils of sewers that many of our friends are anxious that we should be compelled, by Act of Parliament, to protect ourselves from the mischief which previous Acts of Parliament have produced.

Not only does the putrefaction of organic refuse tend to fill the air of our houses and towns with foulness, but this mixture of organic matter with water is attended with other bad consequences.

This arises from the fact that much of the organic matter which we mix with water is distinctly poisonous. The zymotic theory of disease has of late years assumed more definite shape, so that we may now leave what was called the zymotic *theory* and consider the actual facts.

There is no doubt that the actual infective elements of many zymotic maladies consist of microbes, fungoid bodies belonging to the class of fungi known as Schizomycetes, that class which grows in organic mixtures where insufficient free oxygen is present.

These microbes are infinitely small; millions of them may live in a cubic inch of putrifying liquid. Under favourable circumstances they will live for long periods. They will not only live but multiply, and it is at least a question, and a grave one, to what extent these infective germs undergo an increase when mixed with organic liquids such as sewage or milk?

The fact that the zymotic poisons are *particulate and alive* is one which has most important bearings on the subject under discussion. If the poison were a chemical poison, then dilution would practically do away with its power for harm. No amount of dilution is capable of destroying a zymotic poison, in fact it is not impossible that the mere mixing of organic refuse which contains a zymotic poison with water may be the means of keeping it alive and possibly causing it to multiply.

When a mass of organic matter, charged with zymotic particles, is mixed with water and washed out of a house, the water will carry the poison with it wherever it may chance to flow or trickle, to water course, well, or any other source of drinking water; in fact the dissemination is as perfectly and thoroughly done as if dissemination of poison were the main object which we had in view.

When dealing with organic matter impregnated with zymotic

poisons, mere dilution with water increases rather than diminishes the danger.

As long as the poisonous organic refuse is concentrated, its repellent qualities are such that there is little chance of its gaining access to the human body. The microbes contained in it are theoretically capable of infecting an almost indefinite quantity of water, and this large quantity of water masks the repellent qualities of the stuff, and thus the danger of infection is greatly increased.

This dissemination of poison by water is one of which we have had very bitter experience in this country.

There is little room for doubt that, in this country at least, water has been the great carrier and disseminator of the poison of cholera.

In 1849 the mortality in London was highest in those districts getting their water supply from the Thames between Battersea and Waterloo Bridge.

In 1853-54 the same phenomenon was observed. In 1866 the chief mortality was in the district supplied with water taken from the river Lea. With regard to this latter epidemic, we are in possession of many details, and the following is a summary of the facts as given by the late Dr. William Farr in his report on the cholera epidemic of 1866:—

"Several cases of cholera and choleraic diarrhœa had occurred over London in May; and on 27th June, at 12, Priory Street, Bromley, one poor Hedges, a labourer, and his wife, both of the age of 46 years, died of 'Cholera Asiatica,' the former after 15, the latter after 12 hours' illness. These cases are minutely described by Mr. Radcliffe, who traces the discharges into a water closet of 12, Priory Street, and thence 300 yards down the sewer into the Lea (a tidal river which ebbs and flows) at Bow Bridge, half a mile below the Old Ford reservoirs. He attaches great importance to these first cases, and they undoubtedly sufficed to pour into the sewers and waters millions of zymotic molecules, which day by day grew more and more frequent in the Lea, by every hour's choleraic discharges on both sides of the river." A few days later water was supplied to the district from a reservoir, the bottom of which was pervious to the waters of the Lea, and then resulted an outbreak of cholera and diarrhœa which caused the death of over 4000 persons.

I need not give further instances of the dissemination of disease by water-carried sewage, sanitary literature is full of them.

What is true of cholera is also true of typhoid, and I will only say in reference to this subject that (if we accept, as we are

bound to do, the statements put forward with regard to the cholera epidemic of 1866), if the excreta of the Hedge's family had been buried or burnt, the waters of the Lea would not have been infected, and possibly 4,000 lives would have been saved.

The first principle in dealing with epidemic disease is that which is expressed in the words, *principiis obsta*, resist the beginnings. The object of this is evident, and is well expressed by Shakspere in the words—

> "A little fire is quickly trodden out,
> Which, being suffered, rivers cannot quench."

The mixing with water may be looked upon certainly not as a resistance of the beginnings, but rather as a nursing and favoring of them, which, "being suffered," most surely "rivers cannot quench."

The great principle of *principiis obsta* has been most rigidly observed by surgeons in dealing with those forms of blood-poisoning which arise in connection with wounds, and which were known as hospital diseases. To Lister belongs the credit of recognising that the great thing to be aimed at was the checking of putrefactive changes in the discharges from the wound, an end which has been attained by adopting what are known as antiseptic precautions in the treatment and dressing of wounds. A foul wound is looked upon as a great source of danger to the patient himself, and formerly the poisons generated in the wound of one patient were carried by sponges and instruments (which, be it remembered, were "*clean*," as far as any indications appreciable by our unaided senses were concerned) to the wounds of others; and thus it followed that the mortality from what was wrongly spoken of as "hospitalism" was enormous. Now, however, putrefaction in wounds is practically at an end, owing to the use of antiseptics and to an improved appreciation of what cleanliness really means; and as a result of this hospitalism has disappeared.

How marvellous have been the results which have followed on the adoption of the principle of preventing putrefaction in wounds is well shown in a table given in the last edition of "Erichsen's Surgery." This table is taken from a statistical work by Max Schede on amputations, and shows conclusively what are the advantages of antiseptic precautions. I have simplified his statement for the sake of those of my audience who are not acquainted with medicine.

UNCOMPLICATED CASES OF AMPUTATION.

Cause of Death.	Old treatment, 377 cases.	Antiseptic treatment, 321 cases.
Blood poisoning.....	105	3

Thus it appears that the mortality from blood poisoning under the old treatment was 28 per cent., while under antiseptic precautions it is less than 1 per cent.

Antiseptic measures are used in other than purely surgical cases and my friend Dr. John Williams tells me that since their introduction into the General Lying-in Hospital the deaths from that terrible disease "puerperal fever," have practically ceased.

This great result has been brought about by attention to the leading principle of *principiis obsta*.

In my student days the treatment most in vogue for wounds was "pure" water; but now it is recognised that water is preeminently the encourager and sometimes the main cause of putrefaction, which of all things the surgeon tries to avoid.

The foulness of our rivers is largely due to the mixing of putrescible matter with water, *i.e.*, to water-carried sewage, and there can be no doubt that as water-carried sewage increases, the difficulty of obtaining pure water increases also. Water-carried sewage so fouled the Thames "between the bridges," that after the bitter experiences of 1854, the in-take of the water companies was moved to a point above the tide-way. Since then the population all along the Thames Valley has enormously increased, and if we who get our drinking water from the Thames escape disease, it can only be regarded as due to a happy accident, and not to the observance of any fixed principle to effectually prevent the fouling of the river. The precious liquid with which I am supplied from the Thames costs me I think nearly ten shillings per thousand gallons, and I need not say that I am very careful to have every drop which is used for drinking purposes both boiled and filtered.

If sewage finds its way to a water-source I have not much faith in the various modes of "treatment" which it undergoes in those establishments which local boards love to erect for this expensive amusement.

The addition of chemicals, if in sufficient quantity to destroy living organisms, must make the water still more unpotable than before, and can only be of use by making the liquid so utterly nauseous that to drink it would be impossible.

Mere filtration cannot be regarded as any safeguard after the experience of the Lausen typhoid epidemic, in which the poison

of the fever filtered through a mile of earth, which was sufficient to check the passage of particles of wheat flour. Wide irrigation over a large area of land, as is practised in "sewage farming," is probably the best method of treating sewage, but this cannot be regarded as absolutely safe under all conditions for reasons previously indicated.

If antiseptics have been previously added to the sewage, this must increase the difficulties of "farming" with it, as, if the antiseptics have been added in sufficient quantity to destroy disease organisms, this would effectually check the growth of those other organisms upon which the fertility of the soil depends.

It is more than doubtful whether there is any absolute safety in obtaining water from deep wells. The Dudlow Lane well, near Liverpool, having a total depth of 443 feet, was fouled by percolation from cesspools, and percolation from a defective sewer would certainly prove equally disastrous. Surface wells are not now regarded as at all safe, but our suspicions with regard to them were not aroused until after the introduction of the plan of mixing water with putrescible matter. There was no soakage from an old-fashioned dry pit. There must be soakage from a cesspool or "dead well."

The only way of securing pure water is to make quite sure that there is no fouling of water-sources. If this were done, then pure water would be at once plentiful and cheap. It is now very dear, and is getting scarcer every day.

Dr. William Farr said, "a system of sewerage is the necessary complement of a water supply." For myself I should be inclined to say that an extraordinary water supply is the necessary complement of water-carried sewage, because with it our ordinary supplies quickly get fouled. In London we have effectually fouled all our wells, and the state of the Thames is such that a man must be in the very extremities of thirst or else insane before he would drink from the Thames anywhere between Teddington Lock and Gravesend. The state of our noble river is a deep reproach to us, and must remind us day by day of the serious blunders we have committed. As long as it remains as it is, we certainly have no claim to be followed as an example in matters sanitary. London should serve as a warning, as did the drunken Helot to the Spartan Youth.

The fouling of our sources of water supply has driven us far afield for water, and this no doubt has been a great cause of the lessening of our mortality of late years, but it would be unwise to talk of security because we have had no serious epidemic since 1866, an absurdly short period in the history of a nation. It must not be forgotten that pure water is as necessary for animals as it is for man, and that if we persist in

fouling our rivers the poor farmer may have to pay a "water-rate" for providing an artificial water supply for his horses, cattle, sheep, and even poultry. Many diseases of animals are communicable to man, and it is daily becoming more evident that our health is very intimately bound up with the health of our animals, and that their sanitary condition is scarcely less important than our own.

From a financial point of view, water-carried sewage has not been encouraging. It has increased the rates, increased the cost of our houses, and put us to great expense for water. The "treatment" of sewage before it is finally discharged into our rivers is everywhere an expense and nowhere a source of profit, and we find that public sewers which cost millions to construct, cost thousands to keep in repair.

The sewers we have built with borrowed capital. We have seized all the glory and patronage of disbursing enormous sums, and have left posterity to pay the bills. This is a doubtful policy, and I think a most immoral one, but I feel it is little use to raise my feeble voice against the custom which is now so much encouraged of hanging a debt round the neck of our successors. It may be defensible to raise a loan for building town halls, schools, and similar edifices, of which posterity will reap the benefit, but to raise loans for the purpose of wasting most valuable fertilising matter by means of works which will be a constant expense, and never a source of profit, is a very doubtful expedient.

I hope the custom will soon obtain of compelling each generation to bear the charge of its own sanitary experiments—and blunders.

Sewers are constant sources of impoverishment to the soil, and the soil be it remembered is the only *permanent* and reliable source of wealth in any country. The waste of valuable matter which takes place in London and our big towns must make us blush. I wish the waste were limited to our big towns, but it is not so. It is common throughout the country, even in rural districts. Free trade has made food very cheap indeed, and cheap food, especially *imported* food, ought absolutely to increase the fertility of a country, for obvious reasons which I need not particularize. The fertility of this country is not increasing to judge by the agricultural distress. The farmers are crying out for "protection." The first kind of protection needed seems to me to be a protection from ourselves and from the sinful waste of fertilising matters which Local Boards, Municipalities, and Imperial Parliament equally foster.

If we made a proper use of our organic refuse we should enrich posterity. As it is we reap and we do not sow. If municipalities would bury organic refuse, and plant the seed of some forest tree suited to the soil and situation (which in these days of cheap food stuffs would probably be the best branch of agriculture to pursue), they would earn the blessings, instead of the curses of posterity; and they would beautify the face of nature, instead of making it hideous with tall chimneys, pumping stations, and precipitating tanks. This piece of advice will I fear fall very flat, for of all agricultural arts, forestry seems the deadest in this country.

As a defence for gigantic sewage schemes, it is often said that you can do nothing well without co-operation, and this is the excuse for compelling all, whether they want them or not, to contribute towards the cost of sewers.

If co-operation be for a good end, the result is a great good; but if co-operation be for a bad purpose, the result is a great evil. I need say no more.

The last charge which I have to bring against water-carried sewage is a serious one, viz., that it encourages overcrowding in cities, which is universally admitted to be the greatest of all sanitary evils, and one which cannot be counterbalanced.

Water-carried sewage encourages overcrowding becauses it enables us to build houses with no outlet except a hole for the sewage to run through. The growth of London must be a source of alarm to sanitarians, and it is impossible not to admit that our system of sewers has been a most important factor in its production. Look at Charing Cross, where a street of gigantic clubs and hotels has arisen, each without curtilage of any kind, and where a handsome profit has been made by setting the first law of sanitation at defiance. You will find the same thing to a greater or less extent throughout the Metropolitan area.

It is difficult to say why we are so prone to crowd into cities. In former days we crowded behind walls as a protection from our enemies. Those days are at an end, but the crowding is greater than ever. The common cant of the day is that in this 19th century we have annihilated time and space. Certainly in cities both are excessively precious. The telegraph, the telephone, and the steam engine, ought to have diminished overcrowding, but they have not. The stream is still, mainly from the country towards the town, the attraction being the making of money and the spending of it.

It may be well to glance at the effect of this overcrowding in this city.

It is a common remark that London is a very healthy city, and as a proof of this assertion persons point to the death-rate, which certainly of late has not been excessive. The London of the Registrar-General however is a very extensive place, and many of the outlying parts are almost rural in character, so

that if you want to find the effect of living in a crowded city, it is not fair to take London as a whole.

I am no believer in the healthiness of London. It is true that our death-rate has not been raised by any great epidemic of late years, but London is undoubtedly a city where an abundance of second-rate health exists. The crowds that throng the doors of hospitals increase, and in my profession there is a great outcry about "hospital abuse," which means, I take it, that decent folk are not able to cope with the amount of chronic disorders with which they are beset. Again, the mobility of the population in the present day makes our vital statistics very uncertain. Many a healthy person is imported into London, and being wounded in the battle of life, returns to the country to die or recover as the case may be. There is a scarcity of very young and very old people, and in order to appreciate the vital statistics of London, great allowances have to be made for the abnormal age distributions.

In order to judge of the effect of over-crowding, let us look at the vital statistics of the "Strand" Registration District, which is about the centre of London, and from which one would have to walk very many miles to reach the country in any direction.

The "Strand" enjoys many advantages. It is mainly a wealthy district, extending in irregular form from Temple Bar to Buckingham Palace. It includes the whole of the Green Park and half St. James's Park. It has a gravel soil, and slopes gently, with exposure to the south, to the fringe of (potentially) the noblest river in the country. The worst and poorest parts are at the north-east corner.

The true death-rate of a London district is difficult to get. The *British Medical Journal*, however, has been in the habit for the last nine quarter-years of publishing the "true" death-rates of the London districts after complete distribution of deaths occurring in public institutions. I have compiled a table from the nine tables which have appeared in the *British Medical Journal*, so that I am able to compare "The Strand" with the whole of London for nine quarters. and with Dorset (for ten years, 1871--80).

	Birth-rate.	Death-rate.	Zymotic death-rate.	Deaths under 1 year to 1,000 births.
London	32·5	19·9	2·7	151
"Strand," and St. Martin's-in-the-Fields	23·7	21·8	2·6	192
Dorset (10 years 1871-80)..	29·53	17·46	1·68	108

I have chosen the county of Dorset for comparison because it is a "healthy district," and if we are to do any good we must always aim at a high standard. Again, the Dorsetshire labourer has always been a favourite stalking-horse for cockney politicians, and it may be well to show how much healthier he is than the Londoner, notwithstanding his supposed condition of chronic starvation.

This table is very interesting. Dr. Letheby said "a high death-rate means a high birth-rate, and a high birth-rate is the invariable concomitant of prosperity." This dictum does not evidently apply to the Strand.

Dr. Farr, on the other hand, pointed out that "a low birth-rate implies a small proportion of young adults and a large proportion of the aged." This dictum again does not apply to the Strand, as we shall see by a reference to the next table, in which I have endeavoured to make corrections for the abnormal age-distribution which obtains in that district, and which Dr. W. Ogle rightly insists is absolutely necessary before you can arrive at just conclusions.

The table, I think, speaks for itself.

"The Strand"—Mean population 1871–80 = 37,461.

AGES.	Actual numbers living at each age.	Normal age-distribution for a population of 37,500.	Difference (+ &-) between actual and "normal" numbers.	Actual deaths in 10 years, 1871-80.	Deaths which would have happened if the distribution of ages had been normal.	Death-rate at different ages.	Death-rate of Dorset	Deaths which would have happened if the death-rate of Dorset had obtained in the Strand.
Under 5	3597	5100	—1503	3596	5100	99·97	40·07	1440
5—10	3134	4500	—1366	390	548	12·44	4·31	129
10—15	3069	4012	— 943	163	212	5·31	2·79	84
15—20	3824	3640	+ 190	317	299	8·29	4·43	167
20—25	4426	3337	+1089	366	273	8·27	6·65	290
25—35	6773	5513	+1261	963	770	14·22	7·50	510
35—45	5121	4237	+ 884	1246	1000	24·33	10·48	525
45—55	3935	3225	+ 710	1338	1088	34·00	13·04	520
55—65	2311	2212	+ 99	1147	1100	49·63	24·56	565
65—75	1003	1237	— 234	754	900	75·17	55·28	550
75	268	487	— 219	425	774	158·58	151·71	403
	37461	37500		10705	12064			5183

From this table it appears that there was in the Strand during the decade 1871-80 a deficit of 3,812 children under 15, and of 453 of persons over 65, while there was a surplus of 4,233 persons between 15 and 65.

This abnormal distribution ought, according to Dr. Farr, to give a high birth-rate, and a low death-rate. The very reverse is the case, and a critical examination of the figures seems to show that the death-rate in the Strand *is more than double what it is in Dorsetshire.*

It may be said that this high death-rate is due to the presence in the Strand of two hospitals (Charing Cross and King's College), and doubtless these have some material effect in producing the terrible adult mortality.

Hospitals however are generally placed where they are most needed, and I would point out that these institutions can hardly account for the enormous infant mortality; and certainly not for the deaths of infants under one year. Against the fact that the Strand contains two hospitals, is to be placed the not less important fact that it contains no workhouse. This institution is at Edmonton, where it helped to raise the death-rate from 15.8 to 16.9.

It need not surprise us that a population situated in the very centre of the vastest city the world has ever seen should have a high death-rate, and it may be well to look to the causes of death and again to compare the rates from different causes with those in Dorsetshire.

Death-rate from different causes.

	Strand.		Dorsetshire.
Whooping cough	0·62		0·29
Tabes	0·28		0·18
Phthisis	3·65		1·72
Hydrocephalus	0·61		0·22
Respiratory disease	5·92		3·15
Total of Tubercular and Respiratory disease	11·08		5·56
Small-pox	0·11		0·09
Measles	0·36		0·20
Scarlet fever	0·49		0·33
Enteric	0·38		0·19
Violence	1·61		0.49
Diarrhœa	0·92		0·35

No good would be got by extending this table. Suffice it to say that there is no single cause of death in the Registrar-General's tables which is not more active in the Strand than it is in Dorsetshire.

I would particularly draw attention to the fact that the death rate for whooping cough and tubercular and respiratory

diseases for the Strand is more than double that of Dorsetshire, a fact which is not to be wondered at in a population, the bulk of whom only breathe pure air upon the rarest occasions, and who habitually breathe an air so foul that the sun often fails to penetrate it, and which is fatal to almost all flowers and a large proportion of trees.

To me one of the saddest indications of the dismal state of this overgrown city is the appeal, which is now so common in the newspapers, for funds to give poor London children *one* day in the country, with of course the not immaterial deduction of the hours spent in going and returning.

These tables may serve to dispel another popular fallacy, viz., that the sulphur-laden air of London has antiseptic powers, and helps to check zymotic disease.

As a fact those zymotic diseases which presumably travel through the air (Small-pox, Whooping Cough, and Measles), are particularly rife in London. The death-rate from these three causes was during 1871-80:—

	In London.		Dorsetshire.
Small-pox	0·44		0·09
Measles	0·51		0·20
Whooping cough	0·81		0·29
	1·76		0·58

In fact the mortality caused probably by air-borne germs was exactly three times as great in London as in the healthy country district which I have chosen for comparison.

I have endeavoured to show that the admixture of water with putrescible matter is inadmissible.

1. Because it is antagonistic to a law of nature, encouraging putrefaction and delaying nitrification, and there can be no successful antagonism to nature.
2. Because the putrefaction set up in cesspools and sewers by mixing water with putrescible matter has been a direct cause of much disease.
3. Because the practice involves the most perfect dissemination of disease particles, and a neglect of the great principle, "*principiis obsta.*"
4. Because it is the great cause of the fouling of rivers and wells, and makes the obtaining of pure water increasingly difficult.
5. Because it is financially and economically disastrous, crippling the ratepayers and exhausting the land.
6. Because it is one of the chief causes of overcrowding, the greatest of all sanitary evils.

It may be asked, "What useful purpose can be served by talking thus to an audience of Londoners? London is hopelessly committed to the principle of water-carried sewage, and must make the best of it."

To this I reply that even London need not needlessly increase her already insurmountable difficulties, and that happily the whole of England is not yet quite absorbed into London and other cities. There is a very general belief throughout the country that because London has adopted the system of water-carriage it must therefore be the best. This idea is unthinkingly adopted, and to its adoption the distinction of borrowing and disbursing a large amount of other people's money acts as a spur. There has come within my own knowledge the case of a country town, in the midst of a poor agricultural district, which clamoured for a "sewage scheme" for the purpose of polluting its sparkling water-course, where anglers pay large sums for the privilege of trout-fishing; its death-rate being at the time between 16 and 17.

In the Thames Valley, the region of villas and market gardens, a whole crop of "sewage schemes" have lately been put forward, notwithstanding that the more rational methods of sanitation would be easier and cheaper.

Only the other day I visited a lone farm-house which a friend wished to take for the summer, and I found that the proprietor, having taken the soil-pipe of a recently erected water-closet into a cesspool alongside a deep well sunk in the chalk, had rendered his house unlettable to any thinking person; and lastly I heard last week of a friend who took a moor in Scotland, and wished to have rational methods of sanitation, but the noble owner, bitten by the modern craze for water, would allow nothing but water carriage, and accordingly laid his filthy pipes to foul the babbling highland burn, and deprive the soil of that of which it was in need.

Again, in institutions such as workhouses, barracks, schools, and the like, water-carriage is often adopted, notwithstanding the favourable conditions for rational methods. The ignorance of soldiers in this matter is an acknowledged cause of the sickness and mortality during campaigns.

There seems in short a very great necessity for directing attention to the "shortcomings" of water-carried sewage.

What do you propose? will be the next question. My answer is fair play and no compulsion.

Much as I believe in the good of spreading sanitary knowledge, I have little faith in the efficacy and a potent belief in the dangers of sanitary legislation whereby blunders are stereotyped.

The first thing necessary is an equitable adjustment of sanitary rates.

Borrowing for the purpose of constructing sewers should be disallowed, and those who do not need the sewers should not be called upon to contribute towards them, at least not to the same extent as others.

The present inequitable adjustment of sewer rates, is a premium on jerry-built houses without curtilage. Encourage the man who has a little bit of garden to make use of it.

Enforce the Pollution of Rivers Act against individuals, even against proprietors of highland moors.

Let us have a real inspection of nuisances and a harrassing of evil doers, and let us discourage by every means in our power the building of houses side by side and almost back to back, with no outlet but a hole.

Let water be paid for by meter.

I have every sympathy with the agitations of getting allotments for the poorer classes. The best and most economical allotment is one close to the house where refuse may be buried and in due time bring forth.

Those who advocate "sewage farming" tell us that an acre is necessary for every 100 inhabitants. How infinitely better if the 100 people could absolutely live on the acre of ground in (let me say) 20 cottages, each cottage having $\frac{1}{20}$ of an acre. How infinitely better for the man to till this little plot in his spare time, than to occupy his leisure by braying politics in a public house.

Let us calculate the produce of this plot of ground in terms of potato. An acre of a field will produce an average crop of 7 tons; the twentieth of an acre would produce 7 cwts., or 784 lbs. As these would be for home consumption, and would save the man from disbursing money at a retail shop, we may take the value at the average retail price of 1d. per lb., or £3 5s. 4d., or for the sake of simplicity say £3. To give $\frac{1}{20}$ of an acre to every five inhabitants would make a town inconveniently big it may be said. I think not; 100 to an acre is 64,000 to a square mile, or making a very liberal reduction for space occupied by roads, let us say 50,000 to a square mile. This does not sound like an inconvenient scattering of houses. The inhabitants would make £30,000 a year by the produce of the land, a gain of which Free Trade could not deprive them; and there would be no sewer rate, no plumbers' bills, and certainly a vast increase of health, happiness, and contentment.

What I am advocating is no utopian scheme, and I am not talking without some practical experience. A few years ago I bought twenty cottages adjoining a garden which I have in the

country. Many of them had been built with a very insufficient curtilage, and their old fashioned sanitary arrangements made the garden anything but pleasant. My first step in improving these cottages was to do away with the old fashioned pits, which were not suited to the low-lying spot and were always full of water, and replace them by pails. The cottages are systematically scavenged every day, and all refuse, inclusive of food refuse, excrements, and ashes, are buried immediately in the garden. There has been a complete cessation of all offence, and my garden holds the proud position of being certainly one of the most fertile in the district. Roses and other flowers, and all the ordinary garden fruits and vegetables, flourish therein in great luxuriance. The æsthetic aspects of the place have been increased, and in no way diminished, by the course I have pursued. I wish it to be understood that I am no mere theorist, but that I practice what I preach.

I have dealt with this subject from rather a different point of view in a little book, "Our duty in regard to Health," which I wrote for the Council of the Health Exhibition. Those who may care to pursue this subject further, may get the book of Clowes & Co., the publishers, at Charing Cross.

Congresses held by the Institute.

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President.

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CONGRESS AT BOLTON.

INTRODUCTION.

The tenth Congress of the Institute was held at Bolton, from Tuesday, September 20th, to Saturday, September 24th, by invitation of the Town Council.

Very suitable accommodation was provided for the Meetings of the Congress in the Town Hall. The Opening Address of the President, Right Hon. Lord Basing, F.R.S., and the Addresses to the Working Classes, were delivered in the Large Hall (Albert Hall). The Lecture to the Congress and the Meetings of the Sections were held in the Council Chamber and Borough Court, and the Conference of Medical Officers of Health in the Grand Jury Room; the Reception Room and Offices were also provided in the Municipal Building. The Exhibition was held in the new Drill Hall, to which a special annexe had been added.

The Members of the Congress and Visitors were received by the Mayor in the Reception Room, after which a Public Luncheon was held in the Albert Hall: more than a hundred people were present. The Company then proceeded to the Exhibition, and were conducted round the building by the Judges: the Exhibition was then finally declared open by the Mayor.

The Exhibition was continued till October 23rd, and was visited by about 27,000 people; there were 112 Exhibitors. The Judges awarded 6 Medals and 8 Special Certificates, and 30 Certificates. 56 Exhibits were selected for further practical trial and testing.

The business of the Congress was divided into the usual three Sections, viz., Section I., Sanitary Science and Preventive Medicine; Section II., Engineering and Architecture; Section III., Chemistry, Meteorology, and Geology. The Papers and Discussions in Sections I. and II. occupied two days each; one day was also devoted to a

Conference of MEDICAL OFFICERS OF HEALTH, which had been held successfully for the first time in connection with the Congress at York on a somewhat smaller scale.

A Record of the Sectional Meetings and the Conference is given in the Reports of the SECRETARIES on page 469.

A Conversazione was held on Wednesday evening, when about 450 people were present; the MAYOR and MAYORESS receiving the Guests.

Addresses to the Working Classes were given on Saturday evening by MAJOR LAMOROCK FLOWER, MR. WYNTER BLYTH, and MR. H. LAW, M.INST.C.E.; the chair was taken by the MAYOR.

On Saturday an excursion was made to the various reservoirs and works for the Water Supply of Bolton; the party being guided by the CHAIRMAN of the WATER COMMITTEE and other Officers.

During the Congress, several visits were arranged to the Fever Hospital, Cotton Factories, Coal Mines, and other places of interest in Bolton.

E. WHITE WALLIS,

27*th March*, 1888. *Secretary.*

Officers of the Congress.

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INAUGURAL ADDRESS

Delivered 20th Sept., 1887,

BY THE RIGHT HON. LORD BASING, F.R.S.,

PRESIDENT OF THE CONGRESS.

IT will be readily understood that in accepting the Presidency of the Sanitary Institute for the current year, I had no intention of addressing you on the medical or scientific aspects of the subject matter with which we have to deal. Indeed, when my friend, Sir Douglas Galton, did me the honour to express a wish that I should undertake it, I made it an express stipulation that I should not be expected to go *ultra crepidam*, nor to vie with my learned and distinguished predecessors—himself not the least eminent—who have now, through a series of the last ten years, enlightened their hearers in all quarters of this kingdom, and their readers in all parts of the world, by elaborate papers illustrative, from various standpoints, of sanitary science in its relation to the Public Health.

My own connection with sanitary science is exclusively that of the politician, whose experience as a responsible legislator has been mainly engaged in the improvement of our sanitary laws, and who, as an administrator, has been employed in the, perhaps, more difficult task of watching their working and developing their usefulness. Though I speak with much diffidence of my own share in these duties, which could not have been discharged without the consummate knowledge and trained experience which are at the disposal of anyone who occupies the position of President of the Local Government Board, it nevertheless happened that during the rather unusual period of six years, viz., from the formation of Lord Beaconsfield's Government in 1874 to the dissolution of Parliament and break up of that

Government in 1880, I became of necessity intimately acquainted with, and was responsible for, all that occurred in and out of Parliament in relation to the public health, and was so brought face to face with many problems, the conditions of which can scarcely be appreciated except by actual experience in the endeavour to find a solution for them.

Scanty enough seemed at that time the result of all our labours. Many disappointments occurred, and much that might have been advantageous was postponed through force of circumstances; but in comparison with the transactions of more recent Parliaments, one cannot but look back to it as a period of activity and of comparative success: one, moreover, in which many useful lessons were to be gathered from the occasional clashing of the claims for scientific perfection on the part of what I may call the professional expert, with the exigencies of practical politics. Some of the considerations thus arising may perhaps be appropriate to this opening of our tenth conference, and must certainly, in all justice, be taken into account if we desire usefully to compare the shortcomings of the past with the achievements of the present, and with the needs of the future.

One of the shortest paragraphs of the Report of the Royal Sanitary Commission (to which I shall presently refer in some detail) is couched in the following terms: "Inducement should be provided for the study of State medicine, which may be defined as the application of the physical and medical sciences to the preservation of the health of the community at large. It includes (*a*) medical jurisprudence; (*b*) vital and sanitary statistics; (*c*) preventive, as distinguished from curative, medicine."

It seems to me that the time has arrived when we may fairly ask ourselves what progress has been made in this direction, whether there is now a school or study of State medicine, and whether we have actually, or potentially, a Minister and a Government Department of Public Health; but, in the first instance, I propose to examine very shortly the history of the statutory and other steps which have been taken of late years in relation to the subject.

The first sanitary legislation to which we need go back is that which culminated in the Public Health Act of 1848. The early public statutes of the reigns of Richard II., Henry VI., Henry VII., and Henry VIII., to which reference is sometimes made, had little in common with what we now understand by that term; but there is no doubt that from the reign of George II. onwards, the growing wants of populous towns caused their various governing bodies to apply to Parliament for private or special Acts, in order to gain powers for

improving the sanitary condition and supplying the essential health-requirements of the inhabitants; so that the stir of public alarm which followed the outbreak of cholera in 1831, and which brought into existence a variety of administrative and Parliamentary activities, found some useful precedents already established for their guidance through the self-governing instincts of the greater municipal organisations. Cynical experts may smile or point their moral, but, after all, what basis for legislation is more legitimate, or more characteristic of our English methods of proceeding, than the lessons of experience? These must not only be collected and expounded by experts and assimilated in the mind of the statesman, but must be brought home to the convictions of the people before they can be accepted or submitted to in the shape of positive enactment. But, however that may be, it is certain that the period between 1832 and 1848 was marked by the passing of the Quarantine Act of the former year; by the Lighting and Watching Act of 1833; by the great Municipal Corporation Act, 1835; by the Improved Registration Act, 1836; by important reports of the Poor Law Commissioners; by Parliamentary enquiry into causes of disease and of excessive mortality; by Mr. Chadwick's well-known report to the Poor Law Board, 1842; by the Royal Commission presided over by the Duke of Richmond in 1843—1845, and its results in the Nuisance Removal and Diseases Preventive Acts, 1846; and in the Town Improvement Act, 1847; and finally by the Public Health Act, 1848.

The second outbreak of cholera occurred in 1849, and was followed very naturally by attention given on the part of the legislature to such subjects as common lodging-house regulations, and improved water supply, while progress was made under the facilities of the Public Health Act 1848, in the carrying out of local works of drainage and sewerage.

The third visitation of cholera occurred in 1854, and was followed by conspicuous activity in parliamentary dealings with nuisance removal and disease prevention by the Acts of 1854 and 1855. The latter year was made for ever memorable by the first appointment of Mr. Simon, now Sir John Simon, to the office of Medical Officer to the Privy Council. His ability, energy and strong convictions caused him to play a most conspicuous part in all that was done during his régime in connection with these matters, while he may be fairly said to have revealed the true origin and nature of typhoid fevers by his Reports and Essays.

The establishment of the Metropolitan Board of Works in 1855, with new and comprehensive powers for the main

drainage of London superseding those of numberless vestries is, probably, (imperfect as many now think it) one of the most important improvments of the last half century. And the Local Government Act 1858, with Amending Act of 1861—1863, the Diseases Prevention Act and Nuisances Removal Acts which followed, bring us down to the important epoch of 1869, which was marked by the appointment of the Royal Sanitary Commission.

Royal Commissions are favouritive methods adopted of late years by over worked or timid governments, in order to prepare the way for action on subjects of doubtful popularity, and it is to be feared that without such preparation of the public mind Parliament would never have been brought to sanction much of what we now regard as essential and matters of course.

Of all the Royal Commissions which have been thus constituted in our times, few have been more ably manned than this, and none have been so directly and immediately successful in their result, for within the short period of five years almost the whole of their wise and well considered recommendations were carried into effect.

Of this commission and its consequences I will now give a short account, for the particulars of which I am in great part indebted to my friend and fellow worker Sir John Lambert, who has been for many years one of the ablest of our admirable civil servants, and the trusted adviser of successive governments, no matter what their politics, in almost every department of home administration.

The Royal Sanitary Commission was appointed in 1869, and the Commissioners made their report in 1871.

There were twenty-one Commissioners, five of whom were eminent medical men.

The objects of the Commission were:

(1) To inquire into and report upon the various sanitary statutes, with a view to their consolidation and amendment.

(2) To inquire into and report upon the constitution of the several existing sanitary authorities, with a view to the establishment of an efficient sanitary authority for every sanitary area in the kingdom without any overlapping jurisdictions.

The ostensible circumstances which led the Government to appoint the Commission, were the confusion arising from the large number of existing sanitary acts; the inadequate powers conferred by them; the inefficiency, in numerous instances, especially in rural districts, of the local authorities charged

with the administration of the law; the difficulties resulting from the administration of the law by three central authorities, viz., (1) the Home Office, (2) the Privy Council, and (3) the Poor Law Board.

The idea of the Commission seems to have originated with the medical department of the Privy Council, which had for some time been growing up in that office under the influence of the very active and intelligent medical officer (Mr. Simon), who naturally complained of the confusion of jurisdictions of the Home Office, Privy Council, and Poor Law Board, in sanitary matters.

The inquiry by the Commission was of a very exhaustive character, as will be seen by their elaborate reports, which were to a great extent the work of the chairman, Sir Charles Adderley (now Lord Norton), one of the first of our statesmen who grasped the necessity of improved sanitary legislation, and who lost no opportunity of pressing it forward in and out of Parliament. He was, however, assisted considerably by several of the members of the Commission, one of the most active of them being Mr. F. S. Powell,—well known, especially in Lancashire, for intimate knowledge of and interest in the subject,—now M.P. for Wigan, other conspicuous Commissioners having been Mr. Whitbread, Dr. Ackland, and Mr. Bircham.

The digest of the several sanitary acts appended to the report, and which was a work of great labour and importance, was, I believe, the work of Mr. Powell.

The chief recommendations of the Commission were:

(1) That there should be one central authority for all sanitary matters.

(2) That there should be one local sanitary authority, and one only for each sanitary area.

(3) That the law should be amended in certain particulars and consolidated.

The Report of the Commission was made in April, 1871.

In the June following, Mr. Stansfeld, the President of the Poor Law Board, brought in a Bill to give effect to the first recommendation of the Commission by establishing the Local Government Board, to which were transferred all the powers of the Poor Law Board, most of the sanitary powers of the Home Office and Privy Council, and the jurisdiction of the Home Office over the Registrar General.

This Bill became law on August 14th, 1871.

In the following year Mr. Stansfeld introduced another Bill, which he succeeded in passing, the effect of which was to divide the whole country into urban and rural sanitary districts, to establish one sanitary authority and one only for every such

sanitary area, and to amend the law in numerous important particulars.

(*a*) It compelled every sanitary authority to appoint a medical officer of health. In order to induce local authorities to appoint efficient medical officers of health and inspectors of nuisances, Parliament provided for repayment of a moiety of the salaries of these officers when the appointments had been approved by the Local Government Board.

(*b*) It provided for the appointment of Port sanitary authorities, to prevent the introduction of dangerous infections and contagious diseases from foreign countries.

(*c*) It authorised the union of districts and the constitution of joint boards, for works of sewerage and water supply, and for other sanitary purposes.

(*d*) It enabled the Public Works Loan Commission to advance loans for sanitary purposes at a low rate of interest ($3\frac{1}{2}$).

(*e*) It gave the central authority additional powers with respect to provisional orders, enabling them to dissolve, enlarge, or reduce local government districts by provisional order without consent.

(*f*) It also transferred to the Local Government Board the powers of the Board of Trade and Home Office, under the Alkali and Metropolis Water Acts, and the Highway and Turnpike Acts.

It was reserved for the government of Mr. Disraeli and for the Parliament of 1874, to carry into effect the most troublesome and, perhaps, the most important of the recommendations of the Commissioners, viz., the consolidation of the sanitary law, and this was accomplished partly through my humble instrumentality.

The Public Health Act, 1875.

This Act contains no less than 343 sections, and consolidates wholly, with a few exceptions, no less than twenty-two Acts of Parliament.

During the twelve years it has been in force it has required only a few comparatively unimportant amendments, and it may be said to contain the most complete sanitary code that is to be found in any country.

The consolidation of the law by this statute has been of the greatest advantage to all who are concerned in its administration, and has thus assisted materially in promoting sanitary improvement.

It may also be said that it has been uniformly well spoken of by the Judges, who are usually the most unsparing critics of the shortcomings and imperfections of Acts of Parliament as regards their language and drafting.

In addition to the authorities constituted by the Act of 1872, the Local Government Board have, under the powers confided to them by it, established a Port Sanitary Authority for every important port in the kingdom, so that the whole kingdom may be said to be surrounded by a *cordon sanitaire* to guard against the introduction of foreign epidemics.

As a proof of the impulse given by the Public Health Act to sanitary work, reference need only be made to the loans sanctioned for this purpose in the two years before the Act of 1872 came into operation, and in the two years after the Act of 1875 took effect.

Years.	Loans.	
	To Urban authorities.	To Rural authorities.
	£	£
1871—72	1,212,890	*Nil.*
1872—73	541,771	*Nil.*
1876—77	2,563,708	193,615
1877—78	4,182,627	196,972

One great improvement effected by the new legislation was the constitution of the guardians as the rural sanitary authority, and the foregoing figures show that as soon as they were invested with their new powers they began to undertake sanitary works.

Another proof of the activity of the new sanitary authorities is shown by the number of provisional orders issued in the three years before and the three years after 1875.

Date.	Orders.	
1870	35	134
1871	36	
1872	21	
1873	42	
1876—77	102	261
1877—78	81	
1878—79	78	

It is scarcely necessary to say that the provisional order system has been of great assistance to sanitary authorities in enabling them to amend or repeal their local acts, and to acquire lands compulsorily without being obliged to go to Parliament for a special act.

Since 1875 the Local Government Board have issued no less than 838 provisional orders, of which only 49 were opposed, leaving 789 unopposed.

The cost of a provisional order if unopposed is only a few pounds, whereas the cost of a private bill, even when unopposed, is very considerable.

If 600 private bills had been requested instead of these 789 provisional orders, and the average cost of each bill is taken at the low sum of £250, the total would have amounted to £150,000, all of which may be considered as so much saved by the Local Authorities.

The general results of the sanitary legislation referred to cannot be better summed up than by the following figures extracted from the Registrar General's last published report, which shew the average rate of mortality per 1,000 during each of the quinquennial periods, commencing with 1860 and ending with 1885.

Quinquennial Periods.	Ratio of Deaths.
Ending	Per 1,000 Population.
1865	22·5
1870	22·4
1875	20·9
1880	20·0
1885	19·3

So that since 1870, the annual death-rate may be said to have diminished by no less than one-seventh.

It thus appears that the three principal recommendations of the sanitary commission were completed within four years from the date of their report. But there were many other proposals put forward by them, some incidentally, some specifically, which it fell to my lot to deal with, and which became law during the earlier years of Lord Beaconsfield's Government.

Of these I may notice the Registration Act of 1874, which consolidated and amended the existing law, and introduced for the first time, what had long been a desideratum, the compulsory Registration of Births. Students of Dr. Farr's admirable

reports will readily understand how much that is of importance in a sanitary point of view is involved in this very legitimate piece of compulsion. The sale of Food and Drugs Act 1876 was likewise a measure of consolidation, and placed the law as to adulteration on a solid and satisfactory footing. The amended Alkali Act was of the same character, and the recent twenty-seventh report of the Inspector of Alkali Works shows it to be working well and giving satisfaction. The Rivers Pollution Prevention Act, which followed, was rightly regarded as a most valuable establishment of a principle which had long been advocated, but which could only be passed, so great was the apprehension it excited, under a form which left much freedom as to its administration in the hands of the Local Authorities. The time has certainly arrived when its provisions might advantageously be strengthened, so as to secure greater activity and vigilance in their enforcement.

And now, having wearied you by reading detail of what must be to many in this assembly already familiar, let us take stock as it were of the situation at which we have arrived, and ask ourselves the question, how far we have carried out the policy indicated by the phrase "State Medicine" as found in the report of the Royal Commission? In other words, how far does the legislation of the last thirty years supervised by a new department of State under a Minister of the Crown satisfy the public wants in this respect?

Here we are evidently face to face with two powerful currents of sentiment and opinion running counter to each other. On the one hand, the true born Briton is apt to resist and resent undue interference with himself, his personal freedom in things indifferent, and with the self-governing authority of which he is a member or an elector. On the other hand there is certainly a growing tendency to look to Government for help, for direction and for pecuniary assistance in the hour of difficulty and danger, and, moreover, to hold the Government responsible for all calamities which occur, local as well as imperial.

The Local Government Board has in its President a responsible Minister, who is surrounded by a most able and active body of Officers and Inspectors,—medical experts, through whose agency he may well regard himself as the Minister charged with the care of the public health. Through their activity and intelligence, much of the knowledge which is now at the service of the world at large has been collected and disseminated: their advice is constantly needed and eagerly sought by Local Authorities, while the scientific treatises which through their labours have been published from time to time,

form the text-books of the medical profession in regard of public health, and are freely accepted as authoritative on that subject. From their point of view, all that has yet been accomplished is trifling in comparison with that which ought to be done, in the way of watching the public health, of keeping the department abreast of the latest phases of disease and their attendant phenomena, of collecting new facts, and of making known the new conditions which they illustrate, or the conclusions at which they point. More inspectors, more references, more reports, more public expenditure, a more clear recognition by a more definite title than at present of the functions they discharge, and of the Minister under whom they work,—these are the underlying principles which seem to have prompted their action hitherto, and to constitute the ideal at which they aim. But Parliament and the public will not readily accept contentions such as these without demur. For what purpose have local areas been set out, and local authorities established and furnished (partly at the cost of the State) with Medical Officers of Health, with Inspectors of Nuisances, and the like, if it was not to render them self-sufficient and self-reliant in the discharge of their duties? and to what end has information been laboriously collected at head-quarters, if not for the training and guidance of local administrators? By this time—it may be urged—after fifteen years working, the principles thus laid down have become widely known, the practise of the Department is familiar in all urban and sanitary districts, and the time has surely arrived for relaxing rather than strengthening the curb, and for moderating rather than stimulating the central pressure. There is, of course, no finality in legislation, and, as I shall presently show, there is urgent need for going forward in that, and in the correlative work of administration; but due recognition must, in fairness, be awarded to the activity which has distinguished the sanitary reforms and improvements of the past generation, and the public has a right to expect that the local officers who serve them, and the restraints to which they, more or less cheerfully, now submit, shall operate within their respective areas, as a real public health and state-medicine department, on which reasonable reliance can be placed. There arises beyond this a further interesting reflection, which I commend for discussion, viz.: how long, and to what extent, will the medical profession be satisfied to sit at the feet of Gamaliel in Whitehall, and to accept without question the enquiries and reports published at the public charge by persons who, as time goes on, will be under the disadvantage of standing more and more outside of the regular practice of their profession?

These are considerations which may well be submitted on occasions like the present. The Sanitary Institute has now, after the test of ten years' successful working, become recognised, and takes its place among the more important of the Societies who have constituted themselves in this country as volunteer agencies in spreading useful knowledge, and popularising the results of science with a view to their practical application.

It does not lie in their mouth to dispute the importance of encouraging self-reliance and a sense of responsibility on the part of localities. One of the most important of their self-imposed functions is to assist in the special education of health officers, and to award certificates of skill and proficiency which may be of value to the recipients, and give confidence to their employers. It is not many years since the Society of Arts gave similar certificates of general educational acquirement, thus pioneering the way for training colleges and university examinations, through which such objects are now more generally and systematically carried out. On the other hand there need be no fear, and there should be no suggestion, that they would ever be parties to a lowering of the scientific standard; and I think a fair balance of opinion might be gathered from a candid discussion of the subject in these assemblies.

For my own part I do not wish to appear before you as an optimist or as a pessimist—certainly not as an optimist. Passing by for the moment the question of the standard or ideal at which we should aim, I find plenty of material for legislative change, and improvement stored up in various ways, and ready to be put forward when time can be afforded for anything except questions affecting the condition of Ireland. The more urgent of these points (of which I shall presently give a catalogue) have been derived by what I have already described as the most legitimate and satisfactory of all methods, viz., from the applications to Parliament on the part of private bill promoters, mostly our larger and more populous cities and towns, during the last six or eight years. I have twice during that period acted as chairman of the Parliamentary Committees to which the more important of these Improvement bills have been referred; referred, however, with the view of curtailing rather than encouraging exceptional legislation, and of moderating the tendency to extravagant expenditure by means of borrowed money. Many of the provisions mentioned in the list have been conceded, others are so far recognised as needful to be provided that they will undoubtedly be included in the next, nay I hope, the approaching amendment of the Public Health Act 1875.

I well remember, amongst the most remarkable and compre-

hensive of the applications which have been made to Parliament of late years, an elaborate consolidation and amendment of the Bolton Improvement Act, which, together with some others of the like authority, has exercised no small weight in the process of selection to which I have alluded.

Sanitary Laws.—Suggested Amendments.

Although the Public Health Act 1875 may be said to be complete as a general measure, so far as regards the accepted sanitary requirements at that time, subsequent experience has shown it is now capable of amendment in several important particulars.

The following are some of the amendments which have been suggested:—

1. The importance of separating sewage from surface water is now recognised.

The act is, in its present form, practically prohibitive of schemes for that purpose; and power is therefore wanted to enable local authorities to provide a dual system of drainage. The Corporation of Reading were so sensible of the importance of this arrangement that they were mainly induced by a consideration of it to promote their local act of 1881.

2. Provisions are needed to prevent injury to the structure of sewers and their obstruction, and the evolution from them of specially noxious vapours from chemical works, &c.

3. It has been frequently urged that communications between drains and sewers should be undertaken by the local authority, at the cost of the owner, instead of by the owner. The central authority should be empowered to decide upon the junction of the sewers of one authority with those of another.

4. Local authorities might have power to regulate in addition to materials, size, &c., the ventilation and height of sleeping-rooms, trapping, junctions of drains, &c., in connection with dwelling houses. More powers are also needed with regard to enforcing the repairs of vaults, &c., under streets. Provision is also needed for the regular inspection of houses during their construction to see that proper materials are used.

5. Provisions would seem desirable for prohibiting the construction of rooms over privies; and power might be given to impose a penalty on persons who, after notice, neglect to repair or cleanse their closets or ash-pits.

6. A local authority, who undertake or contract for the removal of house refuse, cannot make bye-laws relatively to such removal. They should have power to make bye-laws ancillary to the work so undertaken by them or their contractors.

7. Larger powers should be given to sanitary authorities for the protection, both within and beyond their limits, from pollution of water courses from which they derive their water supply; and lords of manors might be empowered to make grants of waste lands for purposes connected with water supply.

8. Parliament has very generally accepted in local Acts proposals for the prohibition of the use as dwellings of premises constructed, and ostensibly intended, solely for use as "lock-up shops." There might now be a general enactment to this effect.

9. A local authority should have power to cancel the registration of a common lodging house. They cannot do so now.

10. Back-to-back houses should be prohibited in future.

11. Power should be given to proceed against offenders when the article of food has been found unfit for use after it has been sold, or where it has not been exposed for sale but delivered under contract.

12. Many local Acts empower the local authority to disinfect houses. This might now be made general.

13. A considerable number of local authorities have obtained Acts enabling them to require medical practitioners to notify any occurrence of dangerous infectious disease. This matter has been the subject of much controversy, and, perhaps, we must look forward to a fourth epidemic of cholera before it can become general law; but the time has arrived when facilities should be given to the central authority to clothe local authorities with this power on application, so that they need not incur the expense of a local Act for the purpose. I am happy to know that in Bolton this provision of law exists and works well.

14. Sanitary authorities should be authorised to issue notices and advertisements warning the inhabitants against conduct likely to spread infectious disease.

15. It is desirable that some power should be given to remove to hospitals persons attacked with infectious disease, when isolation is not otherwise practicable.

16. Local authorities should be enabled to provide temporary shelter for members of a family in which infectious disease has appeared, whilst the house is being disinfected and cleansed, and to provide nurses for attendance upon persons suffering from infectious disease.

17. A penalty should be imposed on persons ceasing to occupy houses where there has been infectious disease without previous disinfection or notice to owners, or for making false answers.

18. Bodies of persons dying in hospital of infectious disease not to be removed except for burial, and corpses not to be carried in public conveyances other than hearses.

19. The medical officer of health should be empowered to enter a house where he has reason to suspect the existence of infectious disease on obtaining a magistrate's order.

On the other hand I certainly do not wish to appear before you as a pessimist, and I feel bound as the final result of my experience, such as it has been, to say, that, having regard to the comparative novelty, and to the difficulty and obscurity of the subject, to the natural dislike of control, and to the great expense attending works of sewerage and water supply charged exclusively on the occupier; still more, when we remember the disinclination of Parliament to turn aside from the more striking and generally interesting matters which make or mar the fortunes of Governments and Parties, I feel more than satisfied, on looking back over a period of thirty years, to find that so much solid and substantial improvement has been really accomplished. At this moment, my principal apprehension undoubtedly is, that in the anxiety to escape from the irksomeness of detail, and in the hurry to establish Local Government generally on a wider and more popular basis, mischief may unwittingly be done through misappreciation of the difficulties under which that which now exists has been built up, and of the great risk which may be run if such central control as is really still required, were to be hastily surrendered.

But, further, that a pessimist view is in fact unjust and untenable, statistics abundantly prove. I have already given more than sufficient for my case, but I will take the liberty of borrowing, what I am sure our veteran champion Mr. Chadwick will readily lend, a few of the more striking illustrations which he gave to the world on a recent occasion when celebrating the Jubilee of Sanitary Science.

"The present reduced annual death-rate for the metropolis may be stated at 19 in 1000, but the sanitary engineer could undertake its reduction by 5 in 1000, and at a cost greatly below the existing insurance charges for sickness, loss of work, and death. On what experiences, it may be asked, are the statements as to that conclusion based? The answer may be, that they are based on that which has been done for the common lodging-houses—old buildings, once the seats of pestilences, but now cleared of them by very rudimentary sanitary measures; on what has been done in blocks of buildings in the metropolis, and in old urban districts, such as Salisbury, where the death-rate, as high as 40 in 1000, has been reduced to 16 in 1000; in Dover, where 28 in 1000, is now about 14; in Rugby, where 24 in 1000, is now under 12; in Croydon, where 28, is now 10 to 15; in Matlock, where 18, is now 9."

Mr. Chadwick then proceeded to make some remarks leading

up to the important subject of the economy of sanitation which he has recently worked into shape, and which I trust he may be able to lay before this conference, no aspect of it being more likely to influence the popular imagination.

These and similar statistics have been put before the Sanitary Institute by Presidents and other speakers year after year, but they cannot be repeated too often. The period of activity is too soon followed by a relapse into apathy, and even when, through the agency of epidemics or other exciting cause, the time for constructive legislation comes round again, we shall find that the growing tendency to disparaging and fault-finding criticism on the part of public writers and speakers, coupled with the spirit of obstruction which now seems to be paramount in the House of Commons, will render the task of the Government increasingly difficult. They will accordingly require all the backing which public opinion can confer, enlightened as it must be by efforts such as this and other kindred associations are making, to carry them safely through the rocks and quicksands which will most assuredly beset their progress.

The address which I have thus ventured to lay before the Congress, has been couched, for the most part, in abstract terms. But we must not forget that we are meeting in one of the most thriving industrial centres of the great County of Lancaster, and I trust that considerable attention will be given to the application of sanitary science to the needs of the populations which have grown up in these manufacturing districts.

The cotton manufacturers have exercised no small influence in times past over the financial policy of the country. If the wealth and prosperity which followed, and, in some degree, flowed from that policy have caused an aggregation of human beings in and about the central towns to multiply with a rapidity and to an extent prejudicial to healthy conditions, it is here that we should look for activity in remedial measures, and a ready recourse to all that can be done in the way of amelioration.

Can it be said that the existing state of things is perfectly satisfactory? Is not the death rate higher than it should be, and that, even in Bolton, which is more healthy than many places that might be named hereabouts? Does it not, for instance, compare unfavourably with that of London? and, if so, do we find earnestness and discrimination on the part of the local authorities in pressing forward remedial measures, and acquiescence on the part of the people in submitting to the necessary expense?

I have referred to the Bolton Improvement Act; but there are few towns of any size in the County Palatine which are not

provided with similar facilities in the same way, and all are subject to the provisions of the Public Health Act, which, in the greater part of Lancashire, is doubly effective, as the sanitary districts are mostly of an urban character.

In fixing their Congress at Leicester the year before last, the Sanitary Institute was not afraid to beard the lion of Anti-Vaccination in his den; (to little purpose, I fear, if the statements of a letter in the *Times* of September 19th, 1887, are well founded). Let it not be said that we come only to prophesy smooth things at Bolton. We know the energy and capacity of the Lancastrian population. We must not shrink from holding up before them the highest ideal; and I may add, the material advantages which are involved in determined efforts after sanitary improvements. Thus our visit to the north may become, as we should desire, a useful stimulus locally, as well as a signal manifesto of the principles we profess, and of the great national objects we have in view.

SECTION I.

SANITARY SCIENCE & PREVENTIVE MEDICINE.

ADDRESS,

By J. Russell Reynolds, M.D., F.R.S., F.R.C.P.

PRESIDENT OF THE SECTION.

The causes of disease, with which preventive medicine has to deal, are so numerous and so various that it is, first of all, necessary to arrange and classify them in some logical order. This I have attempted to do in the scheme which follows, premising that it is of provisional character only, and may be found useful as a working assistant until something better is propounded to take its place.

1. The first division is between those which are inherent in the individual and those which are brought to bear upon him from outside. In the former category are to be found hereditary constitution, sex, age and temperament; in the latter, all those influences which disturb the balance of income and expenditure of both material or ponderable, and of immaterial or imponderable elements.

Every one has his life conditioned by the former. There is no possibility of eradicating the conditions, or of modifying them, when once developed in an individual; but their effects may be prevented from becoming disease, by timely recognition and counteraction. Every one, on the other hand, requires for the healthy performance of vital functions, an equilibrium between the income of material—in the form of food, air, and the like—as well as the income of heat, light, and other forces, and the expenditure or excretion, or going out of material, and of energy.

Income may be wrong in quantity, or unwholesome in quality, while outgo may be at the same time defective; and so to the introduction of new poison from without is added retained poison from within. It is by the recognition of these causes of disease, and the employment of all our antagonistic powers,