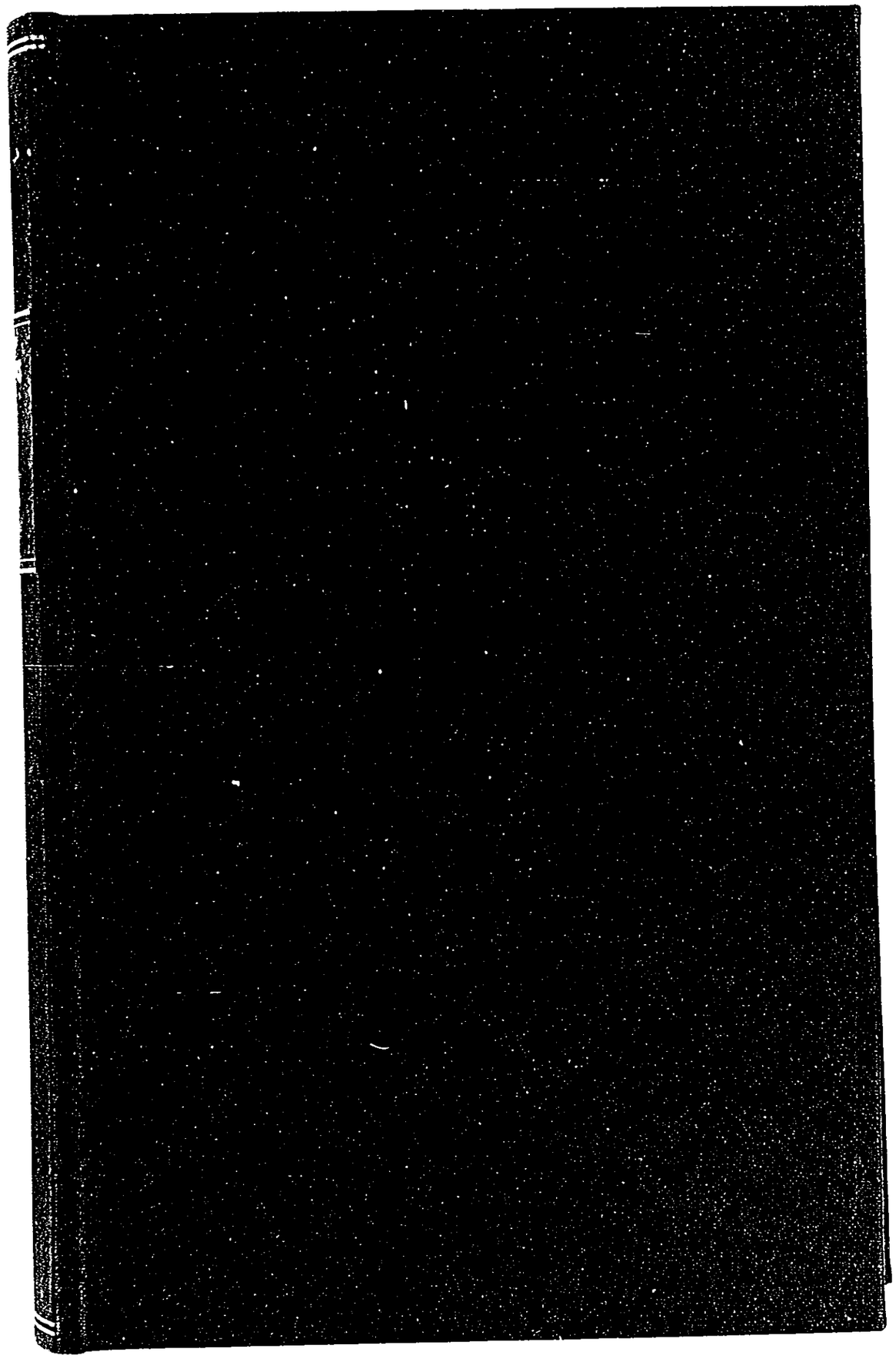

1884-5.

TRANSACTIONS

OF THE

Sanitary Institute of Great Britain.

VOLUME VI.

CONGRESS AT DUBLIN.

1884-5.

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1885.

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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 Presidental 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 preventable 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 1883-4.

The Council of the Sanitary Institute of Great Britain, in presenting their Seventh Annual Report to the Fellows and Members, are much pleased to record that all the statistics in the Report show a larger increase in numbers than in any previous year, and that advance has been made in the objects of the Institute, besides the financial position being more firmly established.

By the kind permission of the Board of Managers, the Anniversary Meeting of the Institute was held in the theatre of the Royal Institution, on July 12th, 1883. The chair was taken by Prof. G. M. Humphry, M.D., F.R.S., Vice-President of the Institute: and the Medals and Certificates awarded at the Exhibition at Newcastle-upon-Tyne in September, 1882, were presented by him to the successful exhibitors. Mr. W. Eassie, C.E., F.L.S., F.G.S., read a paper on "The Relationship between Geology and Sanitation." The paper will be published in Vol. V. of the Transactions of the Institute.

At an ordinary Meeting held on July 24th a paper was read by Prof. W. H. Corfield, M.A., M.D., on "The Compulsory Notification of Infectious Disease." The valuable matter relating to the working of compulsory clauses in those towns in which they are in force has been tabulated, and will appear in the Transactions (Vol. V.) The original returns, containing further information, are preserved in the Office for reference.

The Autumn Congress was held at Glasgow from September 25th to 29th, 1883, by invitation of the Lord Provost and Town Council, the President being Prof. G. M. Humphry, M.D., F.R.S. The Presi-

dential and other addresses to the Congress, and the papers read at the Sectional Meetings, will be published in the Transactions (Vol. V.), together with abstracts of the discussions upon the papers. The London and Provincial Press contained very full accounts of the Meetings, and also commented most favourably upon the general work of the Institute.

Excursions and visits to places of interest were made during the Congress week.

The Exhibition was decidedly an advance even upon the satisfactory one held at Newcastle-upon-Tyne in the previous year. There were 130 exhibitors and 720 exhibits. The Judges awarded 18 Medals, 12 Special Certificates (to articles which had received Medals at previous exhibitions of the Institute), and 46 Certificates. Forty-four exhibits were deferred for further practical trial and testing, the result of these trials will be reported at the Anniversary Meeting in July, when all the Medals and Certificates will be presented. About 20,000 persons visited the Exhibition during the twenty-six days that it was open.

Candidates for Certificates of Competency to discharge the duties of Local Surveyors and Inspectors of Nuisances were examined in June and November. At the Examination in June eleven candidates presented themselves, four for Certificates as Local Surveyors and seven for Certificates as Inspectors of Nuisances. Two candidates were Certificated as competent to discharge the duties of Local Surveyors, and six as competent to discharge those of Inspectors of Nuisances. At the Examination in November ten candidates presented themselves, three for Local Surveyors and seven for Inspectors of Nuisances. One candidate was certificated as competent to discharge the duties of Local Surveyor, and five as competent to discharge those of Inspectors of Nuisances.

The Examinations are becoming very widely known, and the number of Candidates shows a steady increase. Besides the Local Boards and Corporations in England which recognise the value of the Certificates granted by the Institute, the influence of the Examinations is extending into Scotland, Ireland, and the Colonies.

During the year the Institute has sustained the following losses by death:—Cromwell F. Varley, F.R.S., M.INST.C.E., Fellow; Ralph Carr Ellison, and J. Laws, Members; and Matthew Pratt, Subscriber.

Since the last Annual Meeting there have been elected 4 Fellows, 41 Members, 14 Associates, and 2 Subscribers; and the numbers now on the Roll of the Institute are 90 Fellows, 213 Members, 34 Associates, 18 Subscribers, and 30 Honorary Foreign Associates —total, 385.

The retiring Members of Council are Dr. B. Browning; James Mansergh, M.INST.C.E.; Magnus Ohren, A.M.INST.C.E.; Councillor J. A. Russell, M.A., M.B.; Henry C. Stephens, F.C.S.; and J. Ure.

In September the Offices of the Institute were moved from Conduit Street to the Parkes Museum, 74A, Margaret Street; and although the Institute has not amalgamated with the Parkes Museum, their field of labour is so similar, that this association of Offices cannot fail to be beneficial to both. The Members of the Institute have the advantage of free access to the Museum and of the use of its Library.

In accordance with a suggestion made at the Congress, a Committee has been appointed by the Council for the purpose of considering the advisability of collecting and publishing in abstract the writings of the late Dr. William Farr, F.R.S., one of the Vice-Presidents of the Institute. The Committee has made considerable progress, and hopes soon to make a communication on the subject to the Members.

The Congress and Exhibition this year will be held in Dublin, an invitation from the representatives of the leading societies and the most prominent and influential residents in that city having been forwarded by Lord Brabazon, and accepted by the Institute. The Council trust that this Congress will prove as successful as the previous ones, and that the success of the meeting will, by assisting the cause of Sanitary Science in Ireland, promote the objects and interests of the Institute, and benefit the sister country.

(By Order)

E. WHITE WALLIS,

Secretary.

74a, Margaret Street,

7th May, 1884.

SANITARY INSTITUTE OF GREAT BRITAIN.

Abstract of Cash Receipts and Payments for the Year ending December 31st, 1883.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance as per Pass-Book of the Institute, December 31st, 1882:—		34 6 4	By Expenditure:—		
„ Fellowship Fees	31 10 0		Office Furniture	8 5 4	
„ Admission Fees	45 3 0		Rent and Taxes	75 12 6	
„ Life Compositions	99 15 0		Salaries and Wages	203 8 0	
		176 8 0	Postage, Telegrams, and Carriage	38 7 5	
„ Annual Subscriptions		176 8 0	Incidental Expenses	47 17 11	
„ Examination Fees...		55 13 0	Stationery and Printing	75 14 2	
„ Sale of Transactions and other Publications		69 11 8	Ordinary Meetings...	9 18 10	
„ Sale of Office Furniture		3 17 6	Examination Expenses	38 4 0	
„ Congress		68 5 0	Library	0 9 7	
„ Loan from Members of Council		150 0 0	Congress	231 12 3	
„ Exhibition Account		550 0 0	Transactions—Vols. III. and IV....	294 17 2	
„ Overdrawn at Bank		16 3 2	Medals and Certificates	11 5 6	
					1035 12 8
			„ Repayment of Loans—		
			Members of Council, 1882 ...		100 0 0
			„ „ 1883 ...		150 0 0
					1285 12 8
			„ Petty Cash in hand		15 0 0
		£1300 12 8			£1300 12 8

EXHIBITION ACCOUNT.

	£ s. d.		£ s. d.
To Balance 1st of January, 1883	258 12 8	By Expenditure and Transfer to General Account ...	1109 13 11
„ Receipts	1354 11 1	„ Balance at Bank December 31st, 1883	503 9 10
	£1613 3 9		£1613 3 9

Audited and Confirmed,
5th May, 1884.

MAGNUS OHREN,
ERNEST TURNER. } *Auditors.*

ADDRESS

By Dr. Alfred Carpenter,

CHAIRMAN OF COUNCIL.

Read at the Annual Meeting, May 7th, 1884.

Gentlemen,—I find from the agenda paper that it is the duty of the Chairman of the Council to address the Members of the Sanitary Institute at the Annual Meeting. Casting about for a subject which should be appropriate without being diffuse or tedious, I have determined to be as personal as possible in my remarks, and to stick to the objects which the Promoters of the Institute have had in view in founding this association. To ask if those objects are attainable, and, if they are, why seven years have elapsed since the foundation of the Institute without a greater advance being made towards their achievement than has been hitherto effected. These objects are stated in the prospectus which was published in the report of the proceedings of the first Congress, which was held at Leamington in 1877: they were nine in number. They have been varied from time to time to a very slight degree, and are still our "*raison d'être.*" I find among the office-bearers of to-day a considerable number of those whose names appear in the first prospectus of the Institute, and we may fairly assume that those who joined the association in 1877, and who continue to take an interest in its affairs and a share in its management, are still of opinion that its objects are attainable, and that there would be an advantage in their accomplishment. I ask, therefore, why so little has been done to secure the result which was so warmly advocated in 1877, and not repudiated in the succeeding years of our progress. I read that the Institute was established "exclusively for the advancement of all subjects relating to Public Health." I find this statement at the head of the prospectus which was then issued. The proposition then put forth contains the elements of strength, by means of which great good has been effected, but it also contains within its terms the elements of apparent weakness which have not been so fully considered and guarded against by the Members as they ought to have been.

Those who have had the distinguished honour to be elected Members of the Institute, and have signed, or ought to have signed, an undertaking "to advance the objects of the Institute as far as it may be in the Member's power," and have agreed that they will attend the meetings thereof as often as they conveniently can, have not fulfilled their promise. This is now our Eighth Annual Meeting; we have now 384 Fellows, Members, and Associates, and scarcely more than ten per cent. are present here to-day; and I may pertinently ask whether the majority of the Members have done all in their power to promote the design we all have had in view? I will not go through the nine objects set forth in the first prospectus, for that would be both wearisome and tedious. There is no doubt about our adhesion to most of them; but I will take the ninth object, and consider it more fully than it has hitherto been done, and by its means prove that the elements of weakness which exist in the proposition at the very head of our first prospectus are elements which are positive. They have been acting very powerfully against the interests of a consolidated sanitary body, and against the full development of true sanitary work, in a manner which requires to be altered, and a different course pursued, if we are to be successful as an Institute at any early date.

The ninth proposition is stated to be:—

(9.) "To unite into one comprehensive association all the workers in these important branches of science (viz., those which are connected with the promotion of Public Health.")

A large number of our Members have forgotten this object; at any rate, it appears to have lain dormant, for other associations, having similar objects, have been founded; other institutions have been promoted for the purpose of effecting the very work which the Institute was formed to carry on, as it was hoped, to a successful issue, and by means of these we, as an Institute, have been weakened.

I am not finding fault with the work which has been done by other associations, but I am jealous of the honour, and for the honour of the Institute, that a great part of their work has not been done under the ægis of our own association.

We have not been loyal to our Institute; we have forgotten the fable of the bundle of sticks. We have, to some extent, frittered away the power which a body of scientific men like those engaged in sanitary work ought to possess, in endeavouring to promote associations which are upon a much narrower platform than that which the "Sanitary Institute of

Great Britain" occupies. I wish to bring this state of things to the notice of the Members, in the hope that it may lead to some further step in the advancement of that desirable object which is embraced in the ninth proposition, to which I have alluded, and upon the success of which our position as an Institution depends. I have said that the flag of the Institute, by declaring that it is established "exclusively for the advancement of subjects relating to Public Health," puts forth a proposition which contains within its terms the elements of weakness, so far as is apparent to the eye, because it impedes the rapid growth of our association. A bar of gold which is alloyed with a large proportion of silver and copper may appear to have the same colour as a bar of pure gold, and be apparently much more valuable, because it is so much larger; but it is lighter in weight, taking volume for volume, and is really of less value in consequence of the amalgamation. I apply my symbol to our Institution, inasmuch as by not allowing the trading element to creep into our management we materially diminish our area from whence to enrol our Members, for it is only the conscientious manufacturers who are anxious to produce a good article and to conform to the laws of health who care to enrol themselves among our friends and supporters; whilst they who only make goods for the purpose of sale, without any reference to their fulfilling the principles inculcated by the Institute, avoid us, as likely to put a stop to their ill-gotten gains. If they appeal to us for our "imprimatur" upon their production they find that they do not get it, and, as a consequence, each Exhibition which has been held has produced a crop of disappointed exhibitors, who rail against us as prejudiced judges, and are not afraid to style us ignorant pretenders to a knowledge of sanitary science. If my information is correct, some of the disappointed exhibitors have been ready to promote rival institutions, and to use as their agents, men of eminence who have not always seen the tendency of the proposed new body. These institutions have not appeared as absolute rivals, but they have suggested lines of work which do not come strictly within the objects of the Institute, and to those lines they have added some of the lines contained in our "*raison d'etre*." I find in most of these associations a trading element creeps in, and some manufacturing idea is connected with it. I have been associated with one or two myself, without perceiving the evil tendency which inevitably belongs to such works when it is proposed to form sanitary boards who shall operate on lines similar to those which the Institute has adopted. As soon as I saw the evil tendency of these associations I separated myself from them. I am not objecting to the work which sanitary boards may undertake to

perform in such cases, but I would make it a "*sine quâ non*" that the employés who are appointed to superintend such works in the capacity of surveyors and inspectors should possess the imprimatur of the Sanitary Institute of Great Britain before they are appointed to the duty which they undertake in such associations, and the boards which supervise the work should consist only of men who have shown their capability to undertake such work by their having already been elected Fellows or Members of the Institute, and having signed the undertaking to uphold its honour and promote its prosperity. If we could get some tacit understanding of this kind in force among sanitary men; if we could expunge a part of our own personality, and make the Institute the "*alter ego*" of our aims in the promotion of sanitary work, putting aside, as far as we are concerned, the £ s. d. of the case: instead of being the weak and disunited body which fritters away its power in various distinct associations connected with Public Health, as is now the case, we should form the powerful institute of health which is really wanted and which should be the first authority in the kingdom upon matters connected with public health. Instead of being made the prey of some designing set of men who are looking out for the loaves and fishes on their own account, and, not getting them, then allowing the new associations to go to the wall, we might have a magnificent Institute, capable of taking its place in the State with the Royal Society, the Royal Academy, the Law Society, the College of Physicians, the College of Surgeons, and other bodies, who undoubtedly do regulate public opinion upon those points with which they are directly connected, and sometimes even advise the Government of the country upon matters with which they are intimately associated.

One important step has been taken during the past year to effect our purpose; we have migrated from back rooms in Conduit Street to a scarcely more appropriate position in Margaret Street, but by so doing we recognize the work which the Council of the Parkes' Museum is doing, and by associating and indigitating our work with theirs we are paving the way for a more intimate bond of union in the future. I may have Utopian views upon such matters, but I should like to see an Institute which should be Cosmopolitan, which should have a senate as compact as the senate of one of our great colleges, and associated with that senate the various sanitary bodies which are now separate sticks scattered abroad among the Societies of the Kingdom, and without defined boundaries of work, and which, for want of those defined boundaries, overlap each other, and devour a part of the income which belongs to each in carrying on their management at separate offices and by distinct organisations,

when a centralised office and branch organisations would promote the object in view with tenfold vigour and tenfold effect.

This is the age of exhibitions. It has been one of the great objects of the Council to recognise the usefulness of such collections of manufactures and useful works of art; to utilise the custom for the advancement of knowledge among the people in sound sanitary directions.

The real work done by the Institute with this object has brought forth a crop of local imitators. In some instances there has been zeal without knowledge. The worldly wisdom of local managers has led them to distribute medals and other prizes and certificates with a grand disregard for useful superiority and true excellence, but with a loyal adhesion to the principle which recognises the advantage of having a friend at court. No doubt local exhibitions have helped to popularise some sanitary truths, but unfortunately error has also been favoured, and in consequence of that favour the term "*sanitary*" in many instances has been convertible into a much less noble name, which conversion has not helped to forward good work.

The evils I refer to have been very carefully avoided by the Judges appointed by the Council of the Institute, and who have performed their tedious work with a loyal disregard of self and a devotion to the principles embodied in our prospectus, which is worthy of all commendation and support, and which ought to lead the general public to recognise the true value which attaches to the awards of the "Sanitary Institute of Great Britain."

It had been the aim of some of us to promote an exhibition which should be truly worthy of the name of sanitary, and to which the inhabitants of this great metropolis might have been invited as visitors.

As the Chairman of your Council I was preparing to suggest the Council to undertake such a work when I became aware of the proposal to hold such an exhibition at South Kensington, on very broad principles. I need not say that in the face of such an exhibition, held under the auspices of those who were announced as guaranteeing its success, and who were promoters of the South Kensington Shows, the Sanitary Institute would have come off second best. I at once dropped the idea which was uppermost in my mind; and whilst rejoicing in the enlistment of the Prince of Wales in a public health demonstration, I can but regret that the awards upon sanitary appliances and general sanitary improvements had not been left in the hands of the Institute to settle, rather than that judges should be appointed to determine the merits of rival manufacturers and interested patentees, who will probably be new to the work, and

not always capable of recognising the side issues which but too often determine the awards of medals and certificates instead of taking up the broad principles of superiority and true usefulness, independently of the sum which may have been paid for decorating space or spent in advertisements, and other means by which notoriety is to be obtained and success at some kind of exhibitions secured.

It is to be hoped that the fallacies which underlaid some of the awards at the Fisheries Exhibition may be avoided in the awards which will be made by its successor, and that the desire of the Council of the Institute that all side issues may be excluded in making awards at South Kensington, may be obtained. At any rate it will not be the fault of the members of your Council if the judgments are not approved by the after verdicts of the country and the press.

Returning to my simile of the Bundle of Sticks, I would, with great deference, suggest to the Council of the Parkes' Museum, as well as to that very useful and important body, The National Health Society, which is located in Berners Street, the National Smoke Abatement Institution, together with the different bodies who have banded themselves in so-called "Sanitary aid committees" in various parts of this great Metropolis, whether a general amalgamation, upon the broad principles which the Institute aims to accomplish, would not be a real advantage to the great cause which we all have so much at heart. Such an amalgamation would be only an impediment to the self-assertion of some, and to those who try to make capital out of sanitary cries, by which they puff their own wares or promote the sale of something in which they have a pecuniary interest. I also throw out these suggestions to the Members of the Institute, believing that it is a right direction to take. We have Members belonging to our body in every one of the important Associations to which I have referred. If my proposal should meet with general approval, I think the Members should suggest to the Council the appointment of a Committee, with power to add to their number—of course with their consent—of individuals belonging to other organisations, so that a basis might be arrived at for an active co-operation and condensation of power. We might, if such an amalgamation could be brought about, be strong enough to obtain a Charter of Incorporation from the Crown, and then persuade the Local Government Board to issue regulations that no one shall be appointed in the future to perform the duties of Surveyors and Inspectors of Nuisances until they have given proof that they know the duties which they propose to perform, and that they are able to give a reason why a given set of sanitary regulations

ought to be enforced. Such a body would also be able to press upon the attention of the ruling powers that it behoved Medical Officers of Health to have had something more than an ordinary medical education; because such education is conducted more upon the principle of curing than of preventing disease. They would be able also to insist upon the propriety of such Medical Officers of Health not becoming the rivals of their fellow practitioners for the patronage of the well-to-do, or for the good word of the individual members of the local authorities, but would insist upon such officers not being in general practice as medical men engaged in the cure of disease.

There might then be the imprimatur of the Institute upon sanitary officials of all kinds, so that the public might discern between the quacks and charlatans and the true professors. We might then make it impossible for the repetition of such scandals as have arisen in connection with local and other exhibitions, and promote the formation of sound and healthy public opinion on all matters connected with Public Health in a much more satisfactory manner than is at the present time at all possible to be effected.

SOME OF THE PRESENT ASPECTS OF PRACTICAL SANITATION.

Address by H. C. Bartlett, Ph.D., F.C.S.

Anniversary Meeting, July 10th, 1884.

Practical sanitation now presents so many important aspects, that I have to make my selection for this address from those which have lately come within my own professional experience, or those which, from their extreme gravity, have forced themselves upon my attention.

I will reverse the order in which I have just mentioned these aspects of sanitation, as we are all aware of the intense importance which attaches at the present time to the serious outbreaks of epidemic disease with which we are threatened. I say threatened notwithstanding the visitation of small-pox now serious enough in London—4,000 persons having suffered from that loathsome disease during the last six months, of whom, at the time I now speak, more than 400 have died. Shocking as this is, as an evidence of imperfect administration of preventive medicine throughout the metropolis, it is worse as disclosing the want of foresight on the part of the Government, which permits the powers of prevention, already existing under various Acts of Parliament, to remain in abeyance. We are told by the President of the Local Government Board "that it would be a good thing to concentrate the sanitary authorities of the Metropolis under one head, instead of under three heads, as at present, namely, the Boards of Guardians for vaccination, the Asylums Board for removal, and the Vestries and District Boards for disinfection." It is admitted that the actual working under these three separate authorities necessitated the delay of a week before three cases of small-pox could be securely isolated, even when these cases occurred at the "Home" of the Princess Louise. And yet this is to continue until the London Government Bill is passed, if it ever will be, although the most competent medical science predicts, with almost certainty, a renewed outbreak of small-pox in the course of next winter of infinitely greater virulence.

Dr. Cameron prayed for preventive medicine to be enforced under the present Acts, but to be enforced with vigour, and without the present unfortunate delay. He pointed out that in Glasgow, where it is not claimed that all the arrangements and details are carried out in perfection, the annual deaths from small-pox have been reduced to 9 per million; while in London they amount to no less than 226 per million. It was shown that, before unity of sanitary action was enforced in Glasgow, the death-rate from small-pox was much higher than it then was in the metropolis. And statistics, the accuracy of which is not impugned, were given which proved that just as practical sanitation for the prevention of small-pox was more and more strictly enforced, so was the death-rate from that disease reduced, until the very remarkable results, now recorded, were attained. The lessons we learn from the good working at Glasgow are that compulsory vaccination and re-vaccination free of cost to the population is the first essential. To accomplish this we must have compulsory notification of contagious diseases which will also insure immediate and complete isolation and disinfection. In Manchester, Oldham, and Bradford, where compulsory notification is already carried out, as far as the prejudice of its opponents permits, the mortality from contagious diseases is very low. No sentimental or perverse fads can be permitted to exculpate offenders against the penal clauses of these Acts. The so-called religious resistance to the law of the land, which is so painfully exemplified in the fanaticism which resists vaccination, can no longer be partially tolerated by the remission of cumulative fines. Re-vaccination must also be made compulsory, at any cost, even if we lose the voting powers of the agitators against it, together with the whole of their following of fools and knaves.

Vaccination and re-vaccination must be always and immediately available, free of charge, and be applied freely, both to the patient when first seized, and to all persons liable to be affected by the disease having broken out at that particular spot.

I am very earnest on this point, as the latest good news concerning vaccination and re-vaccination is to the effect that in almost all cases where a small-pox patient has been vaccinated for the first time, or re-vaccinated as soon as possible after the appearance of the disease, a great and marked diminution of virulence during the rest of its course has been almost invariably the result.

It is the same with regard to the isolation. To be thoroughly effective against the spread of the disease, it must be carried out at once, and in the like manner disinfection should on no account be delayed.

Among my later opportunities of testing disinfecting apparatus, I have made some interesting experiments as to the actual cost of thoroughly disinfecting clothes, bedding &c.

The apparatus, which is movable, is of iron; the outer shell being covered with asbestos. Between the outer and the inner casings gas jets send heated air, and the products of combustion, into the interior through openings near the top of the casing. The articles being placed inside, and the lids closed, the gas is lighted, and in twenty-five minutes a temperature of 280° Faht. is obtained, with the consumption of 75 ft. of gas.

The apparatus is 7 ft. 4 in. in length, 3 ft. 4 in. wide, and 3 ft. 4 in. deep, and can be maintained at a temperature varying from 280° to 240° Faht. for an hour by the further consumption of 40 ft. of gas. We had thus a total expenditure of 115 ft. of gas, costing a little over 3½d.

The matters tested were articles of muslin, calico, flannel, a flock cushion, some baker's yeast, and some very miscellaneous groups of fungoid spores, pus-cells, microzimes, moving vibrios, and bacteria.

In the result, the muslin, flannel, and other articles, were found quite uninjured and not at all singed, while the yeast, fungoid spores, moving organisms, and bacteria, were killed, and could not be resuscitated by moisture or treatment with Pasteur's growing solution. The yeast had lost all fermentative power on solutions of glucose after a trial of four days at 84° Faht.

With the means of disinfecting the clothes and bedding so easily available, and at so trifling a cost, there is no excuse for delay or neglect in carrying out this most important safeguard. As contrasted with the natural aversion to burning infected bedding and clothes because of the compensation which has to be made, the facility and economy of this plan of disinfection leaves little to be desired.

With the hope that a strong pressure from without may induce combined action on the part of the existing authorities, to take the required steps to prevent further outbreak of small-pox, and to restrain the spread of that which is already in the midst of us, I will turn to the other epidemic with which we are threatened.

With cholera at Toulon, which has spread to Marseilles in the beginning of July, we may well set our house in order and entrench ourselves within the almost impregnable outworks which practical sanitation affords. We have ourselves to thank if our sanitary authorities are remiss or behindhand in the year of grace 1884. We had our warning as lately as this month last year. Then it came from Egypt, and a great scare ensued

throughout all the nations of Europe except our own. All our good neighbours could think of was quarantine upon quarantine; with a complete and abiding faith that if cholera should be on board the detained ships, it would either kill those who had taken it, or be itself destroyed by the patients outliving the disease. Very little was done abroad to stop the means of disseminating the disease in case it did make its appearance on shore, in spite of all the suffumigations and quarantine detentions. The sewers, such as they were, and are, still empty their abominations into the streams and harbours; the house drains still descend untrapped into the sewers or dumb-wells; the soil pipes, or the brick flues which frequently do duty for soil pipes abroad, still pass directly up the houses, frequently in the centre, round which the staircase winds, and are as free from the suspicion of ventilation as ever.

And the water! The water is still that curious fluid which appears to gather to itself all the floating particles, all the foul gases which can be absorbed in it, and to have had a very intimate acquaintance with the aforesaid drains, dumb wells, and sewers. We, on the other hand, evinced very little trepidation. No one suggested quarantine. No; we are too business-like a nation to think of imposing such restrictions on so important a branch of our national trade as to impede our shipping interests. We were, to a large extent, in the right. Quarantine is not a scientific means of preventing the importation of cholera, but I have a slight mental impression that it was almost as much due to the trade instinct, as to the scientific repudiation of quarantine that we owed, and probably shall owe, our total disbelief in that obnoxious and illogical means of prevention.

If it were not for some such motive underlying our superior courage as to the chances of cholera invading us, how is it that our confidence in science has not yet induced us to more largely sustain our reputation by following up the teachings of science?

We are not yet in a position altogether to deride the *laissez faire* of the Continent. Have we no rivers nor harbours into which our sewers drain? Are our sea-port towns, Liverpool for instance, free from an abnormally high death rate from contagious diseases? Yet Liverpool is, in some sense, so advanced in the unity of its administration, yet with such unsatisfactory results, as to be taken by the President of the Local Government Board, *exempli gratia*, as a sufficient reason why London should wait, until further orders from the Government, for sanitary reform.

These are our weak points, and we may find our confidence misplaced in the event of an epidemic of cholera from abroad taking its hold in any of the badly drained towns upon our sea-

coast. But what, after all, is the chief distributor of cholera, according to our most carefully sifted statistics? No one can doubt it is the pollution of our water supplies. We have dealt with London, that is Greater London, in the brief consideration of the epidemic of small-pox. Let us bring home to ourselves the condition of London as to cholera. My friend, Dr. Collingridge, on the 2nd of this month, gave evidence before the select Committee of the House of Commons of the various outfalls of sewage into the Thames. "At Kingston there was a large outfall, two feet in diameter; at Surbiton they had two large outfalls; Thames Ditton had a very foul sewage ditch and other drains. There was a nine inch pipe close to the bridge at East Moulsey." The Chairman stopped the witness, by saying, "I don't think we need go further." Mr. Shiress Wills: "The Committee are well aware that everything drains into the Thames." Mr. Gathorn Hardy (a member of the Committee): "Nobody contends against that." This, in the neighbourhood of the intakes of some of our largest Metropolitan Water Companies, is the evidence which nobody denies. What if cholera were to break out in this largely populated district? I feel of the same mind as the Chairman of the Select Committee, "I don't think we need go further."

But if the evidence of our own carelessness is plainly, far too plainly brought before us, science is advancing, stage by stage, so that by the time we have agreed that we must at length do something, a very superior something will be found available, to anything which could have been brought to bear, if at the beginning of the investigation anything had been decided on. It is like the story of the guns and the armour-plating. We are so slow, so says a great gunnery expert, and we have hesitated so long as to what the gun of the future shall be, that we have saved untold millions of money in experiments which might have been made, and shall now, if we do not go to war for some years, be able to be—"at least on a par with other first-rate powers." So it is with the interception of sewage.

By the time we accomplish the removal of all outfalls in the neighbourhood of the intakes of our great water companies, we are almost certain to have a system of filtration perfected, which really will oxidise and purify such water from all deleterious matters. I would not venture on such a prediction if I had not to a large extent taken the well-known saying to heart, "never predict until after the event." If I had not assured myself that such a system of filtration is not only possible, but, on a comparatively small scale, has already been carried out, I should hesitate to raise hopes which had no sufficient basis.

About ten years ago I was engaged in testing a number of

different filters, and I was particularly struck with the peculiar power of oxidation which some of them possessed. A so-called carbon-block filter oxidised the whole of the complex nitrogenous matter, in what is termed the albuminoid ammonia, and converted them into ammonia pure and simple. For five months that filter continued to oxidise all the oxidisable organic matter of various kinds contained in the 300 gallons of water which passed through it in that time. After that the filter required cleaning to remove the accumulation of sediment which obstructed the flow of water through the carbon. Every care was taken to avoid injuring the filtering medium, but I could never again obtain that perfection of result. Since then I have tested many filters, at least some hundreds, but until lately, in some experiments of my own, I have not found any filter which quite destroyed all the decomposing nitrogenous matters found in highly impure water.

In common with other professional experimenters, I have been content to analyse the water before and after filtration, taking care to pass a very large quantity of water through the filter before making the final test. It has been regarded as satisfactory if a filter removes three-fourths of the albuminoid matters, and gives a bright and nearly colourless water after a hundred gallons at least have passed through. This was considered a good result, and accepted as proving a considerable oxidising power, and if not equal to my Phœnix of filters in its pristine potency, it was deemed to have so far purified the water as to render it much more safe, and infinitely more wholesome.

Little did we know of the fallacy involved. From many years' observation, the medical profession and scientific sanitarians have issued their warnings against trusting to filters to remove any specific infective matters which may find their way into our water supply. Their fundamental axiom has been to keep the *materies morbi* from entering the sources of our drinking water. This consensus of observation and opinion has been, and is, entirely right. It is right because we can never be sure that the water will be filtered, and it is right because, until now, we could never be sure that any filter was mechanically perfect, and would remain so.

We were all aware that carbon blocks might be faulty in construction, that they might be imperfectly fixed or adjusted, that loose filtering media, of iron, or of charcoal, might be so inefficiently disposed for filtering purposes as to permit some portion of the water to pass unfiltered. We knew that if any part of the water did pass unfiltered that very portion might contain a sufficiency of the specific infective matter to be just as great a

source of infection as if the whole had remained unfiltered. The danger is not minimised by partial filtration, it is not reduced one *iota*.

All this is as the leather and prunella to the shoemaker, it is all well known and accepted; but I must state my case.

Besides the obvious fissures in filter blocks, and water-ways which reveal themselves when the blocks are broken open, there are unseen and unsuspected direct ducts in most of the filters which form by-passes, so to speak, permitting water only slightly filtered to pass more rapidly than it would if it traversed the filtering medium as intended. And it is to these ducts or by-passes that the inefficiency of the ordinary filter is due. I have had filters running so slowly as to be practically useless, yet the water which did come through was not filtered. On the other hand, I have had filters which were by no means slow in action, and which oxidised nearly nine-tenths of the albuminoid matters, in which the remaining tenth certainly passed unfiltered by one or more minute but clear and uninterrupted water-ways. I discovered this important fact, which had hitherto escaped detection, in consequence of my faith in certain prepared carbon blocks.

I was endeavouring to take out from some water the last traces of sulphate of barium, which, as chemists know, is only to be accomplished by heating the water, previous to filtration through the finest Swedish paper. In this case I was precluded from heating the water by nature of the experiment, so I attempted to filter the barium out by passing the water through the best carbon block it had been my good fortune to possess. This block actually oxidised nine-tenths of the albuminoid matters in water, and was therefore an exceptionally good specimen. Judge of my surprise, when I found the fine precipitate of barium coming through with great pertinacity. Over and over again I found the same result, and it was some time before I could get a block which would arrest all the sulphate of barium. To prove whether this was mechanically perfect I tried one of the finest of all precipitates, phosphate of uranium, and this it also filtered out. Yet this block did not oxidise so large a proportion of albuminoid matter in water as the other block, and was not so good a filter. To see if I could improve its oxidising action, I mixed a little very fine animal charcoal with some water and passed it through, intending to analyse the water after filtration, when to my great astonishment I found a considerable quantity of the finest particles of the charcoal coming freely through with the water. After a time the water ran clear, and on analysis I found every trace of albuminoid matter oxidised or filtered out.

Repeated experiments prove this to be the solution of the

question, but there are other almost equally unsuspected causes which render the testing of house filters merely by the analysis of the water before and after filtration sometimes misleading. Taking the matter up with great interest, I found that after water has been perfectly filtered, it is liable to become polluted to an unexpected degree by the decomposition of the cork and india-rubber washers and tap plugs. It may not be of very great importance to health, but it is unpleasant to know that two cork plugs taken out of a filter which had been in use for rather more than two years, had become so decomposed that a yellow ring of deposit was formed all round the storage chamber to a depth of about three-fourths of an inch. This, on microscopic examination, literally teemed with moving organisms; yet that filter was an almost perfect filter when the water was taken without being allowed to pass through the storage chamber. I have also found the india-rubber fittings after six months' use covered with a peculiar slime, which proved to be decomposed rubber with free sulphur. It is therefore important that house filters should not contain any kind of decomposable material.

But to revert to the essential of the filtration of drinking water, there is no doubt that this can only be perfectly effected by perfect oxidation. I am now engaged in a series of experiments to compare the oxidising power of very fine carbon, such as that which came through the carbon block, with platinum black, which is the most powerful mechanical oxidiser known. I have already progressed so far as to be able to say that no nitrogenous decomposable matter carried in water can pass through platinum black without being completely oxidised or burnt up. This, of course, includes the specific infective matters of diseases communicable through water. If we could afford to filter all our drinking water through platinum black, we could secure total and perfect immunity from infective matter in water. But at two guineas an ounce this would be an expensive luxury. I have no doubt that the extreme fineness of the platinum black is the means whereby the oxidation is effected, and for the same reason the strong oxidising power of the finer particles of carbon is probably due to their extreme minuteness. I hope to find it when used on a large scale amply sufficient to ensure the complete destruction of all albuminoid organic matter in water, including, as I previously said, the specific infection which is known to be mainly disseminated through the agency of drinking water.

So much for this aspect of practical sanitation, but I cannot conclude this portion of my address without pointing out to the public at large that they can easily test their filters for themselves, to see if they are mechanically well made and fitted. Take a little of the finest powdered charcoal, which should be previously washed with hydrochloric acid to remove the lime, mix it in a cup with water, stirring it well, throw it into the filter, and if any comes through, the filter is useless until the charcoal fills up the excessive porosity. This it may do, but very frequently the fine particles continue to pass through *ad infinitum*. I am sorry to say that my own experience of thus testing the majority of filters is, that not one in ten is effecting any reliable filtration at all.

As a natural outcome of discussing the means of purifying water for the prevention of infectious disease, some recent experiences of the legal and administrative action which certain authorities have lately taken, stand up prominently before me, and are not pleasant aspects of practical sanitation.

One of these cases occurred in the northern suburb of London, where some cottages derive their water supply, partly from a well and partly from a very sufficient storage of rain water from the roofs. The latter is laid on to every house, and is nearly equal to supply all the tenants for two months, in the event of no rain falling during so long a period. The well is between 45 and 50 feet deep, steined with bricks set in cement, and fortified with a backing of concrete. The Medical Officer of Health, however, pursues a peculiar method of erecting his own standards of purity, by which he determines whether sewage does or does not find its way into the wells in that neighbourhood. He takes the average analyses of the water from a certain number of wells in the district, which are of admittedly good character. He finds from this, what he calls the normal proportion of chlorine in the good water of that locality. Other constituents are also averaged for the same purpose, but the quantity of chlorine, taken as chloride of sodium, or common salt, in any sample of well water within that urban authority is the principal evidence upon which it is passed as uncontaminated, or, if in excess of the average, it is denounced as therefore full of sewage. This is a mistake, *ab initio*, and the mistake is the greater, inasmuch as the oxidisable portion of the nitrogenous matters, the nitrites, are not separately estimated. On the data so furnished, notice was given to the occupiers of the cottages and to the owner, that the water was full of sewage and dangerous to health, calling upon the owner to lay on "a proper supply from the mains of the Company supplying that portion of the district." These proceedings commenced about four and a half years ago, and it was considered necessary to ascertain if the water from this well was so polluted as to be unfit for drinking purposes. In that case the well would have been voluntarily closed imme-

diately. The tenants were, however, very anxious to retain the well water, which was agreeable, bright, and cool.

The analysts to whom it was submitted did not find any proof of contamination from sewage, and the Local Authority was so informed. Again and again were the notices served upon the tenants and on the owner, stating that further analyses of the water had been laid before the Authority, and that legal proceedings would be taken if the water from the company's mains was not forthwith laid on to all the cottages. During a period of more than three years this peculiar procedure was continued, keeping the lady in a constant state of apprehension that the action against her would be commenced. The Authority was informed that if they would bring the matter to an issue the owner was prepared to defend the action on the ground that the Local Authority could not prove the water to be injurious to health, and could not therefore obtain an order to close the well. Over and over again summonses were issued and then withdrawn, and at last, after nine months' more worry, expense, and annoyance, it was definitely settled by the Authority that they would proceed under the 62nd section of the Public Health Act, 1875, to lay on the Company's water under the report of the Local Surveyor that there was not a proper supply of water to the cottages. Here, it is important to observe that a surveyor can only report upon the quantity, not the quality of the water, and a "proper supply of water" is very different in meaning to "a supply of proper water."

The Local Authority was then challenged as to whether there was not a sufficient and even a superabundant supply of water already available, and to try the case under the 70th section, which gives power to close any well which is so polluted as to be injurious to health.

The abundance was admitted, but the Medical Officer declined to certify that it was injurious to health, notwithstanding all he had so often reported concerning the alleged pollution of the well from sewage.

Here was a mass of contradictions. No one had previously heard of an attempt being made to force a supply of water from the outside upon tenants, who did not want it, while they were amply supplied with rain-water, and from a well which the Authority would not dare to make application to close.

To cut a long story short, the Authority submitted another sample of the water to their County Analyst, who examined the well and surroundings, and pronounced the water to be pure and wholesome. Then another sample was sent to an Analyst, whose reports on the London water supply are often quoted, but without describing the peculiar geology of the

surrounding soil, or informing him that this well was sunk through the Boulder clay, which contains many descriptions of glacial drift. It was, therefore, unlike most of the other wells in the neighbourhood, which are sunk in the common London clay. Not knowing the singularity of the formation just at this place, this gentleman supported the Medical Officer, by stating the water was full of sewage, and dangerous, but not injurious to health. The case was tried and the summons dismissed, the Authority altogether failing to prove that the water was unfit for drinking purposes. The last mentioned witness, indeed, contributed somewhat to this conclusion by stating, with much emphasis, "that the presence of normal healthy sewage in drinking water was not injurious to health, its only effect being to cause those who drink it to become fat." If I had not taken down the actual words at the time I should not have the courage to repeat them now.

Irrespective of this, one of the nastiest aspects of practical sanitation, it is lamentable that a local authority can, year after year, harrass and worry an unprotected lady, and put her to the expense of many hundred pounds in resisting their demands. These, when brought to an issue, at last, are found to be based upon a bad interpretation of the law, and upon certificates which could not possibly sustain their case. It can be no additional comfort to the lady to know that the heavy expenses incurred by the Authority will come out of the rates to which she is a large contributor.

There is no legal estoppel to prevent the same Authority from issuing similar summonses half a dozen times more, or, if they had succeeded in laying on the Company's water, from finding that to be an improper supply, which, indeed, it is from insufficiency, and then insisting on laying on another supply from another company having mains within the district. This phase of sanitary administration is an unmitigated hardship for all owners of wells, and the Local Government Board is inclined to admit that it is so. But the Local Government Board states it has no power to restrain the action of the Local Authority until money has been spent by the latter in so laying on the water, or until they further proceed to recover the amount from the owner of the property. In this instance proceedings were stopped and all the expenses were incurred before that stage was arrived at; and the owner could only recover the legal costs of the hearing before the magistrates—a sum of ten pounds out of so many hundreds.

Now is the time to urge householders to set their houses in order, and particularly to clean out and keep their cisterns clean. It is of no use for me to agree with Sir Robert Rawlinson,

although I do agree with him, and say I would have no cisterns, and that "constant service by pipe and tap only, alone deserves the name of a modern domestic water-supply." We know that throughout large districts in London and elsewhere, if there were no cisterns there would be no supply of water during twenty-two out of the twenty-four hours. But the cisterns can and must be kept clean, and for drinking water let none be taken from the cistern, however cleanly it may be kept. Let every householder have a draw-off tap fitted to the rising main, which fills the cistern—the cost of this is very trifling. Glass-lined piping is used extensively in America, and, where practicable, is found better than lead or unlined iron piping. Then have a large water-can, which can easily be kept scrupulously clean, ready to fill about ten minutes after the water begins to come into the cistern. Two or three gallons is all that is required in a small family, and this should be invariably passed through a good house-filter, which has been tested with the finest charcoal and found to be mechanically sound. It is equally essential that all parts of the filter can be thoroughly and frequently cleaned. This plan obviates the want of the constant service at the least possible trouble, and it is well worth a great deal more trouble to practically abolish the cistern for drinking water. Begin with the cistern, and then see that the drains are properly trapped and disconnected. It would not, however, be wise to attempt to disturb old defective drains or cesspools at this, the hottest season of the year, but they can be so dealt with as to greatly lessen the dangers they store up. We should be lavish with our disinfectants. The so-called chloride of lime, carbolic acid, and other powerful agents are disagreeable enough, but we must put up with that if we have any old drains or cesspools, and it may be accepted as a rule that pleasant-smelling deodorants or disinfectants, and disinfectants without smell, are useless for these purposes.

Descending to the lower storey we come face to face with our old enemy the dust-bin. What can we do to overcome this grim and ghastly concentrator of garbage? Disestablish it at once, cast it away and never more permit a heap of sweltering corruption to poison the air, insult the olfactory nerves, and, may be, prove a very centre of infection. As long as there is a dust-bin, and servants are permitted to throw potatoe-peelings, cabbage leaves, and other vegetable refuse into it, we inevitably find there fish-bones, scraps of putrid meat, and all kinds of animal matter, thrown away because too disgusting to give to the dogs or cats.

The accumulation of all the decomposable matter left at table and rejected from the kitchen, even from a small family, becomes

formidable in a week of hot weather, an intolerable nuisance in a fortnight, and a hot-bed of putrescent pestilence soon after. Yet it is not very seldom that three weeks elapses before the dustmen can be induced by bribes and threats to remove the heaving conglomeration of filth. Appeals to the vestry are always courteously received, and the contractor's men are forthwith ordered to call and remove the dust. But, somehow, it happens that they have no ladder with them long enough to reach to the bottom of the area, or their baskets are so large that they will not pass through the trap-door of the grating, although that trap-door was specially constructed to make the removal of dust and refuse more easy and less offensive. Once able to go away without emptying the dust-bin, and you have to go through the same course of application to the vestry, before you can insist upon the men doing their duty, and then, perhaps, only by allowing the men to bring the dust all through the house. These are not ideal or exaggerated statements, for they have occurred many times at my own house, and at the houses of many of my friends. It is high time, as Sir Robert Rawlinson says, that there should be "no more black-mail levying by dustmen, nor sulky neglect if their tribute be not freely paid." The most systematic arrangements should indeed be made for the removal of dust once or twice a week, and that arrangement should be made in writing and duly agreed to by the vestry. Never let the men break through the arrangement by a single day without at once sending a formal complaint, and insist upon the duty being carried out.

But to assist in this, and to reduce the nuisance to the smallest dimensions, we must adopt the very excellent plan devised by a friend of mine, a lady, the wife of an eminent physician, residing in Mayfair. It consists in this:—First get rid of the dust-bin, do not tolerate it even as a receptacle for ashes and dust. Then provide two or three small sacks, such as those used to hold a hundred weight of coals, hang them up by several cords to keep the mouths distended, and let the dry dust and ashes be placed in them direct from the dust-pans and fire-places. No vegetable or other decomposable refuse must ever be mixed with the dust and ashes, and this is essential. The dustmen find it easier to remove the dust and ashes in this way as there is no digging out of the pestiferous dust-bin, no filling reeking baskets, and the bulk is lessened by two-thirds.

Then, what is to become of the vegetable and other refuse? I find in the larger households, that if this is left to the cook, and the cook is sharp enough to take the hint, persons are to be found who will not only collect these matters daily, but will pay the cook a trifle quarterly for the privilege of so doing.

In smaller establishments all decomposable refuse must be burnt.

There has been the difficulty, that in attempting to burn green stuff, fish bones, and other offal, in the ordinary stoves and grates, the stench becomes unbearable. We all recognise that *odeur piante* which instantly ascends all the stairs and descends all the chimneys, until everyone in the house knows that the right thing is being tried to be done, but in the wrong way. No ordinary grate or stove will burn this refuse without creating a bad smell, and most of the kitcheners and close stoves make it worse. I have, however, in the investigation of this matter, seen one close range or kitchener which burns up all kinds of refuse without allowing any unpleasant smell to escape, and that is one which has received several awards from this Institute, and is known as the Wilson range.

I have also been surprised to find an open grate of the most ordinary description, such as is commonly found in sitting-rooms and bed-rooms, made to consume vegetable and other refuse without smell, very successfully, by a simple back-flue arrangement, which is shown at the International Health Exhibition by Mr. Stobbs. Such are some suggestions, failing the best plan of all, which is adopted in Amsterdam and some Towns in Scotland. Even in Gray's Inn, London, every bit of dust and refuse is placed outside the door early in the morning and collected with less cost and trouble than is possible by the usual dilatory and dangerous dust-cart system. All these little matters of detail are apparently but trifles, yet they are so important that not one of them can be neglected with impunity. The strength of a chain is measured by its weakest link, and Public Health and wholesome surroundings can be relied on only when we are assured that there is no missing link in the chain of sanitary precaution.

Within the scope of practical sanitation comes the great food question of the day, namely, how are the poorer classes to be fed, so that they may maintain health and strength, not only to enable them to exist and do their daily work, but to defend them against epidemic disease? In our selfishness or carelessness this is a question which is not sufficiently discussed or thoroughly gone into. We are content to think of it as a matter which can be regarded from a very general point of view. We accept the fact that we have an immense number of under-fed and badly-fed persons, whom in the same general way we sympathise with, and wish they were better off. We are charitable, too, as far as subscribing to hospitals, dispensaries, and district visiting societies, and an incalculable amount of good is by these means effected. It has been left to one individual to take up the greatest want of the poor neighbourhoods, that of providing markets at which food can be purchased at prices not unduly beyond those which remunerate the producer. To the Baroness Burdett-Coutts is due the unspeakable advantage of striking boldly at one of the closest of food monopolies, that of the supply of fish. With the zealous co-operation of Mr. Burdett-Coutts, the fish is caught, forwarded, and sold at Columbia Market, with no middleman's profit beyond the percentage justly payable to the stall-keeper.

This is a bold and courageous attack upon trade combinations which have for their object nothing but the gross enhancement of the cost of perishable food, until it reaches a perfectly prohibitory price. If time permitted, I could lay bare the means adopted to carry out a system by which hundreds of tons of good fish are destroyed, rather than allow a glut in the market to reduce the prices to their proper level. All this, the wants of the half-starved poor notwithstanding!

I am, however, more concerned with precisely the same kind of trade combination in respect to the price of bread. In my own house, with but few to keep, and indulging in the ordinary variety of fish and meat, vegetables and fruit, our requirements for bread are but small. Whether the price of household bread is 7½d. or 5d. per four pound loaf, it would not make a difference of much more than one shilling per week. But, take the household of a labourer with the average family of two adults and four children. This means a consumption of at least of from thirty to thirty-six pounds of bread per week, and the poorer the family the greater the amount of bread consumed. A difference of one penny per quartern loaf therefore means ninepence a week, either saved by, or extorted from the poor pittance of, the hardest worked classes of the community. It is true that a still greater food-saving might be effected if the labouring population would sink their prejudices and give the cheap whole-meal or granular wheat-meal bread a fair and unbiased trial. But take them, even as they are, and let them adhere to their fancy for fine white bread; it is a most astounding fact to find that bread is sold to the poorest of the poor under the regulations of the Master Bakers' Associations, at from 6d. to 7d. per quartern. The Baker's Record, the organ of the trade, under date of the 28th of June, this year, quotes "Households, 7d.; Neville's, 6½d.; Aërated, 5½d. to 6½d.; and *very inferior qualities*, 4½d. to 5d. The real truth necessitates a fuller inquiry. With the assistance of Mr. W. Whitfield, a solicitor, who has lately had to obtain legal evidence of the underground working of these associations, I find that while the price of bread is kept up to 6d. per quartern, in the poor

neighbourhood of Bow and Stratford, there is at least one baker there who is an independent man, and who offers to supply excellent bread in quantities at 4¼d. per 4lb. loaf, full weight. I have obtained a sample of this bread, and I can professionally testify that it is as good as that with which I am supplied at 7d. for ready money. While the poor are paying 6d. a quartern at the East-End of the Town, and it will pay well to retail really good bread at 4½d. (and the poorest always insist on the quality being good), it proves that at the present price of wheat, the middle men are extorting 25 per cent. more than a handsome and legitimate profit. I ask, in the name of humanity and practical health economy, is there no other great benefactor, such as the Baroness Burdett Coutts, who will come forward and help to break down this monstrous monopoly. If any favourable response is given to this suggestive enquiry, I will personally undertake to bring forward another master baker who will guarantee to produce good bread for sale to the working classes at less than the lowest price quoted, and yet show a fair and reasonable working profit. Free trade has reduced the price of wheat until our own farmers cannot cultivate corn to enable them to pay their rent, in fact, in bad seasons it does not repay the expense of seed, farm labour, and bringing to market, irrespective of rental. Why, then, should the whole advantage that cheap wheat should afford to the poor be absorbed by the middle man before it reaches them? Why should the price of wheat have no relation whatever with the actual cost of bread, even in the poorest neighbourhoods?

Perhaps we may assume that few subjects have attained a larger public interest than the movement which has of late years endeavoured to deal with the abatement of fog and smoke. From the time when so many cattle died at the Agricultural Hall, during the show, owing to the dense fog which prevailed, there has been unanimity of evidence to demonstrate the bad economy and unhealthiness of shooting the contents of the coal-scuttle into the air. My friend, Mr. W. R. E. Coles, has kindly supplied me with a large number of facts, including an analysis of the return of convictions for offences against the Smoke Acts in the Metropolis, extending over a period of five years. It appears that the magisterial treatment of the cases was very unequal, and that the present administration does not comply with the letter—far less the spirit—of the legislation. A new Bill in Parliament will, it is hoped, carry the prevention of smoke much farther than has been possible hitherto. The universal complaint that lung disease in large towns is aggravated to a serious extent by the particles of soot which descend, in fine weather and in fog, and the detestable dirtiness which

the so-called blacks produce, and is unique in its universality, form reasons sufficient to induce us to urge the adoption of every practical means to alleviate the evil. Measures of prevention must include penalties on the one hand, and instruction how to avoid them on the other. The latter is the main object of that excellent Institution for National Smoke Abatement, whose good work is gradually producing the best results in stimulating inventions to enable us to burn fuel without waste or smoke.

The instruction, which experience alone can give us, is being quietly reduced into a systematic form by several other institutions besides that of the institution just mentioned. We have our own good reward in the Sanitary Institute, in finding that our own examinations are from year to year more sought after. Local Surveyors and Sanitary Inspectors come in larger numbers, and more eagerly to test their efficiency before our Board of Examiners. We still find, unfortunately, that there are men already holding good positions, who come forward with a misplaced confidence, assuming that because they have the appointments they must have the knowledge to enable them to obtain our much prized certificates, without adequate study. On the other side of the shield, we are frequently pleased to find the reflection of studious men, who intelligently follow out their study in their practise, whose examinations prove them to be men of resource and knowledge, well fitting them to occupy the highest offices in the Sanitary Executive.

A great advance has been made in this respect, both by the Sanitary Institute, and by the Local Surveyors and Sanitary Inspectors, who evince so laudable a desire to be certified, and it must be taken as an evidence of a want which has long been felt. I am certain that these voluntary examinations are but the thin end of the wedge which will ultimately open up all such responsible appointments to those alone who prove their competency by their certificates.

Credit must also be given to the Board Schools, if we are to take as a sample the written examination of May Austin, age thirteen. This youthful aspirant to practical sanitary knowledge sends in her paper from the Rea Street Board School, Birmingham, and is of Standard VII. In answer to the question, "What special points would you think of in choosing a house?" answer, "Dryness, light, good air, good water, and good drainage." In delineating these "principal points," the descriptions are so terse and full, so complete, and leave out so little of what is essential, that unless the whole examination and teaching is the cut-and-dried result of mere *memoria technica*, nothing could be more satisfactory. If May Austin can reply on paper equally

well to half a dozen more questions coming equally within the scope of our own examinations, and pass a by no means more difficult "*viva voce*," I feel bound to admit to myself that I, as an examiner, must pass that very clever little girl—certainly as a Sanitary Inspector, and perhaps as a Local Surveyor.

Passing from the room in the Health Exhibition in which this examination paper is shown, I came upon one of the methods of teaching; it is labelled—"List of apparatus for object teaching." The case contains a few articles for making the earlier rudimentary experiments in physical chemistry: a spirit lamp, an evaporating basin, a wire tripod, a watch-glass, and a few other well known accessories to the simplest lecture-table, are enclosed. But these are supplemented by a printed ticket, which states, for the instruction of teachers, that "many articles in every school-room may be used in addition to the above; thus, the tongs will serve for holding larger objects in the fire, and, if a pestal and mortar be needed, the poker and shovel will answer the purpose." This exhibit must be an elaborate joke—a comic aspect of science-teaching by the Great School Board of London—and is charmingly suggestive of the calibre of such teaching.

If I have brought forward no grand conception of the Sanitary future; if I have been unable to generalise upon the whole condition of the Sanitary present; if I have afforded no history of the time past in Sanitary progress, it is because I was specially invited to deal with the subject as a practical one. It is also that I should not have had the temerity to occupy so much time for any other purpose.

Congresses held by the Institute.

LEAMINGTON, 1877.

President.

B. W. RICHARDSON, M.D., LL.D., F.R.S.

Presidents of Sections.

Section I.—Edwin Chadwick, C.B.
" II.—George Wilson, M.A., M.D., F.C.S.
" III.—R. Brudenell Carter, F.R.C.S.

STAFFORD, 1878.

President.

EDWIN CHADWICK, C.B.

Presidents of Sections.

Section I.—B. W. Richardson, M.D., LL.D., F.R.S.
" II.—Henry Day, M.D., F.R.C.S,

CROYDON, 1879.

President.

B. W. RICHARDSON, M.D., LL.D., F.R.S.

Presidents of Sections.

Section I.—Alfred Carpenter, M.D., M.R.C.P.Lond., C.SS.Camb.
" II.—Captain Douglas Galton, R.E., C.B., D.C.L., F.R.S.
" III.—G. J. Symons, F.R.S.

EXETER, 1880.

President.

THE RIGHT HON. EARL FORTESCUE.

Presidents of Sections.

Section I.—Prof. de Chaumont, M.D., F.R.S.
" II.—R. Rawlinson,, C.E., C.B.
" III.—Sir Antonio Brady.

NEWCASTLE-UPON-TYNE, 1882.

President.

CAPT. DOUGLAS GALTON, R.E., C.B., D.C.L., F.R.S.

Presidents of Sections.

Section I.—Denis Embleton, M.D., F.R.C.S.
" II.—H. Law, M.Inst.C.E.
" III.—Arthur Mitchell, M.A., M.D., LL.D., F.R.S.

GLASGOW, 1883.

President.

PROF. G. M. HUMPHRY, M.D., F.R.S.

Presidents of Sections.

Section I.—Prof. W. T. Gairdner, M.D., LL.D
" II.—Prof. T. Roger Smith, F.R.I.B.A.
" III.—R. Angus Smith, P.H.D., F.C.S.

DUBLIN, 1884.

President.

SIR ROBERT RAWLINSON, C.B.

Presidents of Sections.

Section I.—T. W. Grimshaw, M.A., M.D.
" II.—C. P. Cotton, M.Inst.C.E.
" III.—Charles A. Cameron, F.R.C.S.I.

The next Congress of the Institute will be held at Leicester, commencing Sept. 22nd, 1885.

CONGRESS AT DUBLIN.

SEPTEMBER, 1884.

PAPERS AND DISCUSSIONS.

CONGRESS AT DUBLIN.

INTRODUCTION.

The Seventh Congress of the Institute was held at Dublin from September 30th to October 4th, 1884, an invitation signed by nearly all the influential and official residents having been sent to the Council and accepted during the meeting at Glasgow.

The buildings placed at the disposal of the Congress by various Societies were particularly suitable for the meetings. The President's Address was delivered in the Lecture Theatre of the Royal Dublin Society. The Provost and Senior Fellows of Trinity College granted the use of part of the College for the Reception Room and Sectional Meetings. The Lecture to the Congress was delivered in the Antient Concert Room, Great Brunswick Street.

The Inaugural Address to the Congress was delivered by Sir Robert Rawlinson, c.b., on Tuesday evening, Dr. Alfred Carpenter presiding in the absence of Professor G. M. Humphry, President of the last Congress.

The Lecture to the Congress was delivered by Dr. Alfred Carpenter, on Friday evening, and as no lecture was given to the working classes during the Congress a number of free tickets were issued for this Lecture.

The papers submitted to the Congress were divided as usual into three sections, each section commenced on a separate day, but so many papers were received leading to important discussions that it was found necessary to continue the meetings of Sections I. and II. on the days following.

A paper read in Section I. upon the object and work of Ladies' Sanitary Association excited considerable interest, Countess Spencer and many other influential ladies attended the meeting.

On Tuesday morning a breakfast was given by the Institute, to which the Secretaries of the Congress and Secretaries of Sections were invited to meet the Council of the Institute.

A public luncheon was held at the Exhibition Buildings on Tuesday afternoon, The Right Hon. The Lord Mayor presided, and

welcomed the Institute to the City of Dublin, and afterwards formally opened the Exhibition.

A Conversazione was given at the Mansion House by The Right Hon. The Lord Mayor, on Wednesday evening, at which there was a very numerous attendance.

On Thursday evening the Congress Public Dinner was held at the Shelbourne Hotel. Sir Robert Rawlinson, c.b., President of the Congress, took the Chair, and was supported by The Right Hon. Earl Spencer, Lord Lieutenant of Ireland, and The Right Hon. The Lord Mayor. (An abstract of the speeches will be found on page 421).

The Royal Zoological Society of Ireland gave a breakfast to the officers of the Congress on October 3rd.

Two Excursions arranged for Saturday, one to the Vartry Waterworks, and the other to Great Southern and Western Railway Works, Inchicore, proved very interesting, but were not largely attended.

The Exhibition was held in the spacious buildings of the Royal Dublin Society, at Balls Bridge, and remained open until October 18th. There were 134 Exhibitors and 900 Exhibits. The Judges awarded 1 Silver Medal presented by the Exeter Gas Company, 13 Bronze Medals, 11 Special Certificates, and 64 Certificates; the Special Certificates being awarded to Articles which had received Medals at previous Exhibitions. Thirty-nine Exhibits were deferred for further practical trial and testing; the result of these trials will be reported at the Anniversary Meeting, in July, when all the medals and certificates will be presented. About 35,000 people visited the Exhibition during the nineteen days that it was open.

On Saturday, October 4th, an Evening Fête was held at the Exhibition, and an adjoining Hall was decorated and fitted up for the occasion through the exertions of a Special Local Committee. About 4,000 people were present: the proceeds of the Fête were devoted to the hospitals in Dublin.

The Entertainment proved so successful that it was repeated with some modification on the Monday evening following.

At the closing Meeting of the Congress it was announced that the Council had accepted an invitation to hold the next Congress in Leicester.

E. WHITE WALLIS,
Secretary.

March, 1885.

Officers of the Congress.

President:

SIR ROBERT RAWLINSON, C.B.,

Chief Engineering Inspector, Local Government Board (England), Chairman of the late Royal Sanitary Commission of Dublin.

Vice-Presidents:

The Right Hon. THE LORD MAYOR
The VISCOUNT POWERSCOURT, K.P.
The Right Hon. VISCOUNT MONCK, G.C.M.G.
The LORD BRABAZON.
The Right Hon. LORD O'HAGAN.
The LORD ARDILAUN.
The Right Hon. D. PLUNKET, Q.C., M.P.
The Right Hon. E. GIBSON, Q.C., M.P.
The Right Hon. THE O'CONOR DON, D.L.
Sir ALFRED POWER, K.C.B.
Col. Sir J. G. M'KERLIE, R.E., K.C.B.
Sir P. J. KEENAN, K.C.M.G., C.B.
Sir John LENTAIGNE, C.B.
Sir ROBT. JACKSON, C.B.
Sir GEO. H. PORTER, Surgeon to the Queen in Ireland.
Sir ROBT. KANE, LL.D., F.R.S.
HENRY ROBINSON, Esq., C.B., Vice-President Local Government Board.
Lt.-General R. H. SANKEY, C.B., Chief Commissioner of Public Works.
Surgeon-General A. C. C. DE RENZY, C.B.
The Hon. the RECORDER of Dublin.
The REGISTRAR-GENERAL for Ireland, Fellow of the Sanitary Institute.
The Rev. the PROVOST of Trinity College.
The Rev. the RECTOR of the Catholic Univ.
The PRESIDENT of the King and Queen's College of Physicians.
The PRESIDENT of the Royal College of Surgeons.
The PRESIDENT of the Royal Dublin Society.
The PRESIDENT of the Chamber of Commerce.
The PRESIDENT of the Royal Institute of Architects, Ireland.
The PRESIDENT of the Inst. of Civil Engineers of Ireland.
The PRESIDENT of the Statistical and Social Enquiry Society, Ireland.
The PRESIDENT of the Academy of Medicine, Ireland.
The PRESIDENT of the Irish Medical Asso.
The PRESIDENT of the Dublin Sanitary Asso.
The CHAIRMAN, Public Health Committee of the Dublin Corporation.
The CHAIRMAN of the Waterworks Committee of the Dublin Corporation.
The CHAIRMAN of the Committee of Dublin Sanitary Association.
JOHN KELLOCK BARTON, Esq., F.R.C.S.I.
MAURICE BROOKS, Esq., D.L., M.P.
CHARLES A. CAMERON, Esq., M.D., Superintendent Medical Officer of Health, Dub.
J. RAWSON CARROLL, Esq., C.E., F.R.I.B.A.
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CHAS. COBBE, Esq., J.P., D.L., M.A.
C. P. COTTON, Esq., M.Inst.C.E. Engineering Inspector Local Government Board.
F. R. DAVIES, Esq., K.J.J.
CHAS. DAWSON, Esq., M.P., Ex Lord Mayor.
WM. FINDLATER, Esq., M.P.
EDWARD CECIL GUINNESS, Esq., D.L.
ION TRANT HAMILTON, Esq., D.L., M.P.
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Col. KING-HARMAN, M.P.
Professor E. HULL, M.A., F.R.S.
R. D. LYONS, Esq., M.B., M.P.
F. X. MAC CABE, Esq., M.K. & Q.C.P., Medical Inspector Local Gov. Board.
ROBERT M'DONNELL, Esq., M.D., F.R.S.
E. D. MAPOTHER, Esq., M.D., Consulting Sanitary Officer, Dublin.
RICHD. MARTIN, Esq., J.P., D.L.
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J. W. MOORE, Esq., M.D., F.K.Q.C.P., F.R.Met. Society.
Alderman GEORGE MOYERS, LL.D., J.P.
PAREE NEVILLE, Esq., C.E., City Engineer.
FREDERIC W. PIM, Esq.
S. U. ROBERTS, Esq., Com. of Pub. Works.
J. EMERSON REYNOLDS, Esq., M.D., F.R.S.
J. C. SMITH, Esq., C.E., Hon. Sec. Institute of Civil Engineers.
C. UNIACKE TOWNSHEND, Esq.

Local General Committee.

The Right Hon. the LORD MAYOR.
The VISCOUNT POWERSCOURT, K.P.
The Right Hon. VISCOUNT MONCK, G.C.M.G.
The LORD BRABAZON, Fellow of the Sanitary Institute.
The Right Hon. the LORD O'HAGAN
The LORD ARDILAUN.
Sir JOHN C. KENNEDY, Bart.
Sir GEORGE HODSON, Bart.
Sir P. J. KEENAN, K.C.M.G., C.B.
Col. Sir J. G. M'KERLIE, R.E., K.C.B
Sir JOHN LENTAIGNE, C.B.
Sir ROBERT JACKSON, C.B.
J. BALL GREENE, Esq., C.B., J.P., Killiney.
The Right Hon. the LORD CHIEF JUSTICE of the Queen's Bench.
The Hon. Mr. JUSTICE MURPHY.
The RECORDER of Dublin.
The REGISTRAR-GENERAL for Ireland.
The PRESIDENT of the King and Queen's College of Physicians.
The PRESIDENT of the Royal College of Surgeons.
The Rev. the PROVOST of Trinity College.

LOCAL GENERAL COMMITTEE—*Continued.*

The Rev. the RECTOR of the Catholic Univ.
The HIGH SHERIFFS of the City and County.
The CITY, COUNTY, and UNIVERSITY MEMBERS.
WM. FINDLATER, Esq., M.P., Fernside, Killiney.
CHARLES H. MELDON, Esq., Q.C., M.P., Rutland Square.
The PRESIDENT of the Royal Dublin Society.
The PRESIDENT of the Royal Irish Academy.
The PRESIDENT of the Irish Med. Associan.
The PRESIDENT of the Royal Hiber. Acad.
The PRESIDENT of Dublin Branch of British Medical Association.
The PRESIDENT of the Inst. of Civil Engineers of Ireland.
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INAUGURAL ADDRESS

By Sir Robert Rawlinson, C.B.,

PRESIDENT OF THE CONGRESS.

By Royal Commission, dated the 9th September, 1879, the Queen, in the terms of that Commission, for divers good causes and considerations, deemed it expedient to order that there should be a full inquiry in Dublin into the sewerage, drainage, and general sanitary condition of the city and of the state of the River Liffey, and for this purpose nominated Robert Rawlinson, Esq., C.B., and Francis Xavier Frederick MacCabe, M.D., to make such inquiry, and on Tuesday, the 30th September, 1879, at the City Hall, the inquiry was commenced, and was taken intermittently through fifteen days, ending Thursday, 13th November.

The evidence and report having been since that time in possession of the Corporation need not further be mentioned, other than for reference as I may deem necessary.

Since the year 1879 the Corporation of Dublin has taken in hand and carried out various sanitary improvements in the regulation of room-tenements, improved scavenging, improved abattoirs, and in improved labourers' dwellings. The purification of the River Liffey is, however, a work which remains to be accomplished.

I will not attempt to describe all the improvements undertaken by the Corporation and the local Sanitary Associations, as I anticipate details will be furnished in papers to be read before the several Sections at this Congress.

We shall have the great pleasure of listening to the Addresses by Dr. Grimshaw, the Registrar General for Ireland; by Charles D. Cotton, Esq., C.E., Engineering Inspector of the Local Government Board of Ireland, and by Charles A. Cameron,

M.D., City Analyst and Superintending Medical Officer of Health for Dublin. These gentlemen preside over the three Sections into which the work of the Congress has been subdivided.

Sanitary science is as old as literature—that is, we find references to laws and regulations for preserving health in the oldest books known; as in the third book of Moses, LEVITICUS, and the reasons for some of the ceremonial regulations may even now be easily understood, such as avoidance of unclean meats and isolation of contagious diseases—leprosy for instance—leprosy in the person, in garments, in sites, and in houses; the regulations for the purification, by burning, of leprous-tainted garments, and the pulling down and removing the materials of leprous houses may, with advantage, be adopted by Christian communities in all countries. There are at this day what may be termed leprous sites, produced through ages of continued pollution by human excreta, upon which stand leprous-tainted houses, and in which dwell their wretched inhabitants, having about their persons leprous-rags as clothing. That something akin to leprosy exists in sites and in houses may be inferred from the fact that in our great towns, London certainly, hospital surgeons recognize types of disease, and these the most malignant and deadly, as coming from special streets, and even from special houses; and when, to accomplish certain improvements, these houses, streets, and inhabitants have been removed, that type of disease ceased. This terrible condition, under which causes of disease, both infectious and contagious, undoubtedly exist, has not been fully recognised, so as to be provided against and prevented. We shall, I trust, hear something practical from some of our members as to the necessity there is for a readier and fuller notification of the outbreak of certain diseases which are known to spread with great rapidity when neglected.

On the other hand, one of the greatest works to be accomplished by sanitarians will be to stem the torrent of sanitary ignorance now working so much mischief, and causing incalculable human misery, without in any useful degree lessening the fearful evils existing.

Quarantine, as now practised, works at enormous money cost as well as incalculable inconvenience, and produces much misery without preventing the effects intended to be warded off. At this day quarantine is rigidly in force over the southern nations of Europe, but cholera, the disease so dreaded, is not prevented. The Italian Army is placed on guard at the frontiers, and the strictest quarantine regulations are cruelly enforced at ports and harbours; but within the lines—and almost simultaneously—cholera appears, at Spezia, at Milan, at Turin,

at Naples, and at Rome, with a probability of its raging from the Alps to the Adriatic. Quarantine has not, in these cases, served any useful purposes, either at Marseilles, at Toulon, or at Naples, but fumigations and confinement in lazarets have caused much misery, as also much mischief, by confining the healthy and by aggravating disease. The seed-beds of cholera have not been cleansed; the crowded tenements have not been lime-washed and ventilated; the filth-sodden, corrupt surfaces and subsoils remain occupied, and polluted water is used; the unventilated courts are there, and unwholesome feeding is continued. Houses and clothing in these overcrowded districts swarm with vermin. A cordon of armed men attempting to shut out cholera from such areas is attempting the impossible.

Those of our English medical men who have had the widest experience of cholera in India declare that this disease is not dependant, in the sense usually understood by quarantine promoters, on moving human intercourse, that it is not conveyed in ships from one port to another, and that it is not contagious, strictly speaking, neither does it always affect the apparently foulest sites in a district. In India the natives, at special seasons, travel from long distances in great numbers to worship at certain shrines, they are poor and ill fed at starting, they suffer extreme fatigue by travel, and undermine their health by night and day exposure to the elements, they drink impure water, the result being that cholera breaks out amongst them; when,—untended and uncared for, they perish. The poor feeble native when fatally smitten makes little complaint, but draws himself together, covers his head, and without audible groan, like a stricken creature, uncared for, dies. The poor pilgrims have suffered for days and nights—hunger, thirst, and exposure, only to end their journey by death from cholera, whilst resident natives housed on polluted sites, in filthy hovels, feeding on poor food, and drinking impure water; because they are not so worn by travel and starvation do not take the disease—do not die of cholera, so that it would appear that to foul sites and an unclean population there must be added a worn and exhausted constitution.

Plague has been apparently banished from Great Britain, but still prevails in the cities of the East. In these great countries murrain first breaks out amongst cattle. It is noted that in Chinese cities, preceding any outbreak of plague or cholera, the rats turn out of their hiding place in the sewers, stagger about, and die.

Cholera is said to have been known in China, as in India, from time immemorial, long before the commencement of the Christian era. It was attributed to demons, to mere pent-up

airs which gave rise to vomitings and purgings, and was divided into two forms or kinds, the wet and dry—in the latter, the most fatal type, there is neither vomiting nor purging, and this is the most deadly form of cholera at the present day. There are records, many of them mythical—commencing several thousand years ago, and reaching down to the present date—recording destructions by the elements: as earthquakes, floods and famines, followed by plagues and pestilences. The living not having been sufficient to bury the dead. The great powers of Nature, for destruction, have not ceased, though dormant. Modern research has indicated that the crust of our globe is in an unceasing tremor, subject as of old to earthquakes and tornadoes. This little favoured spot of the earth's surface called England is not free from warnings.

It is not necessarily the duty of sanitarians to teach the doctrine that dirt and disease are in all cases cause and effect, neither is it their duty to declare that they are not. Dirt is to be removed or avoided; disease is, as much as possible, to be prevented, and so far as human agency extends men should strive for a sound mind in a sound body.

I do not suppose that, however much sanitary science may aid in the promotion of comfort and in the reduction of disease, it will ever carry its votaries to the verge even of full prevention, as there are cosmical causes which have been, are, and ever will be, beyond human control. Excesses of heat, excesses of draught, and excesses of cold, have destroyed vegetable, animal, and human life over vast areas of the earth's surface almost to extinction, and there is nothing more certain than that cosmical changes in the seasons similar to those which have occurred in the past will be repeated in the future. We know nothing of the origin of life. We move at the bottom of an atmospheric ocean over which we have no absolute control; the composition of which, in bulk, we cannot alter. We find health under certain conditions; malarial disease and death under others, and how little can we affect these elements one way or the other! Let us note what are the elements we have to consider. The sun furnishes heat to evaporate the ocean water, and out of these elements proceed our meteorological changes. The vapour, invisible at first, forms into cloud, which again condenses into snow, hail, dew, and rain, precipitating these over ocean and land. Clouds aggregate and brew up tornadoes and tempests, to settle down into the gentle and refreshing shower and breeze. All the pure water in springs, streams, rivers, and lakes, has been cloud-conveyed from the salt ocean to the sources and sites where we find it.

England is a small island, situate under a temperate climate,

having a wondrously varied stratification, a comparatively pure atmosphere, and soil almost entirely free from malaria. Her population is, in the main, orderly, sober, and industrious; her wealth, the greatest ever heaped together on any similar area of this earth by labour. There are more and better formed roads and richer cultivation, than in any other country of the world, ancient or modern, and every child born into the land, and every immigrant who cares to reside in it, is, in a degree, heir to the whole; nevertheless, after 1884 years of Christianity, what a beggarly account in our town slums and country cottages do we find! We may congratulate ourselves on our wealth, on the ability of our statesmen, on the purity of our Judges, and on our municipal self-government, and on our colonial empire; but we have much to be ashamed of, and much to amend in our social economy. This Congress meets for the purpose of considering these defects in the body politic, and also for considering how best to devise and apply further remedial measures. Something good has been accomplished, but much remains to be done.

A review of errors in belief and in practice ought to teach us charity to our neighbours, as also how to avoid making similar mistakes in the future.

This establishment of quarantine on the continent, for instance, is both a cruel and a costly proceeding. It is established in ignorance, and is worked in selfishness (reason apparently cannot teach, but self-interest may). It is stated that the bankers this summer (1884), have issued some four millions of pounds sterling less than usual to continental travellers, in circular notes; and I think we may assume that a much larger sum will be lost to the inhabitants generally, by fear, by sickness, by premature deaths, and by losses in diminished trade on land and water. Premature deaths such as cholera produces, verging upon a cholera scare, are costly all round, costly in a way and to an extent only approximately to be estimated, but it may fearlessly be asserted that if money to the value of the losses inflicted by quarantine, and by cholera, had in the first instance been applied to sanitary works and regulations would have gone far to sewer, drain, and cleanse every foul cholera-smitten city on the continent.

In commenting on cholera it must not be forgotten that this disease is not so destructive as the ever present fever under its various forms. Typhoid is answerable for far more deaths than cholera, and there are also nameless diseases which run their course; the sins of the fathers being visited upon the children to and beyond the third and fourth generations.

Before leaving this reference to cholera I cannot refrain

from referring to a despatch from Sir Edward Malet on some features of the cholera epidemic in Egypt, 1883.

Writing from Cairo, August the 6th, 1883, he says, "I have almost daily visited different parts of the city and its suburbs, and there is hardly a district with the condition of which I am not more or less familiar. It is, however, simply an abuse of words to talk of sanitation in connection with Cairo, every sanitary law being grossly set at defiance.

"The canals are, in many instances, little better than sewers, and no precautions, at least none deserving the name, are taken to keep the sources of water-supply free from contamination by excreta and filth.

"Conditions for the development and spread of disease in almost every form, epidemic or otherwise, abound. They are here, there, and everywhere, present to sight, smell, and taste.

"The Medical Department stands in great need of thorough reorganisation, and as to a Sanitary Department, I am not aware that such a thing exists."

The above remarks are strictly speaking only applicable to the defective Egyptian sanitary arrangements, but nevertheless it is disgraceful that so severe a sentence on our own army medical administration in Egypt could be written, as is to be found in the blue-book on the failures in the Army Medical Department in Egypt of last year,—after the experiences of the Crimea,—after the Army Royal Commissions, inquiries, evidence, and recommendations,—after the establishment of Netley Hospital, and the able, zealous, and earnest teaching of the late Dr. Parkes,—after the published suggestions and recommendations of the Army Sanitary Committee, the medical breakdown is astonishing. It must be said that the war department had learnt nothing, but the fault has not been so much in the medical department as in the army organisation. Sanitary science has not been believed in at head-quarters or thought to be necessary, and its professors must have been considered unworthy of notice. The army sanitary commission sent out by the government of the day in the spring of 1855 to the British Army in the Crimea, found the hospitals on the Bosphorus destructive pest-houses, and the army before Sebastopool fever and cholera smitten; the Commissioners were credited by the Prime Minister (Lord Palmerston), to the generals and admirals, and were armed with full powers to hire labour and provide material for hospital-cleansing and ventilation, and within three months they so cleansed and ventilated the hospitals as to banish malarial fever. Cholera lingered sporadically throughout the camp during the summer; but, nevertheless, by the end of the year the entire

British army was in better health than it had ever been at home, and continued in good health to the close of the war, when the French had some 40,000 men down in typhus fever—Turks, Sardinians, and Russians suffering largely from typhus also.

On the return of the British army after the war, commissions of inquiry were ordered, which resulted in barrack improvements and great reduction in army mortality both at home and abroad, but especially in India.

The results of the recent Egyptian Campaign show, however, that at head-quarters nothing practically has been learned—but continental nations and North Americans were not slow to learn the sanitary lesson taught by the Crimean Commission.

The outbreak and prevalence of cholera in Egypt last year, and in France and Italy this year, may teach a useful lesson if properly interpreted. "What is cholera?" "What are the prime causes of its prevalence in certain districts at uncertain seasons?" I, individually, will make no other reply than that "I do not know." But that cholera breaks out for a time, and prevails where there is excess of dirt, and that it also attacks and kills immoral people, impure livers and dirty people are facts well known; but it does not by any means kill all these, and as an illustration of the progress of epidemics, I remember once watching the forest leaves falling in early autumn, after a night's frost, coming down in showers. It occurred to me to consider why all the leaves did not fall at once, as all were similarly exposed; but then the fact became evident, that the weakest stems gave way first, then those which had more vitality perished gradually, one after the other; until the trees stood leafless and bare. So of disease in the time of an epidemic, the weakest sicken and die first; those who have more strength enduring the longest. Then, cholera does not prevail in all places, and sometimes, apparently, not even in the visibly dirtiest places, or amongst the dirtiest looking people in the same town; these are facts well known to medical officers and inspectors of nuisances. The outbreaks and the ravages are apparently arbitrary, so much so as to baffle understanding. Where there are correct maps of districts or of towns, on which cholera cases and deaths have been plotted, it will be seen that the disease has been of a character erratic and partial. The black spots representing deaths are in patches; some close together, others wide apart; the intervening clear spaces being apparently, on examination, just as bad as where the mortality has been greatest. If we imagine that on such a site there had been scattered in isolated patches grains of gunpowder, resting harmless until the spark necessary to explosion fell amongst

them, and that then the explosion extended so far and no further than the sparks fell or the grains of powder were in contact, we should have results not unlike those which take place during explosions of cholera. This form of illustration is no doubt very imperfect, but may serve as an illustration of what is a difficult question, namely, What is cholera, and how is it propagated? That occasionally it is epidemic we know. That it is contagious, in the sense imagined by the ignorant, experience does not prove. It is, however, at times sporadic, taking individuals here and there, now and then, who may frequently be resident wide apart. Unsound meat and impure water may be factors in causing cholera, but not the sole cause, as these are ever present, and many who die of cholera are not water-drinkers. In some outbreaks the most destitute portion of the population has not suffered, whilst the artizan class has. The very poor in summer lived mostly in the open air and drank water; the artizan slept in an unventilated tenement room and drank beer. The outcast escaped, the artizan died.

Much has been most ably written about cholera by men like the late Dr. Farr (whose name I mention with the most profound respect), who obtained their information from official returns, but had little if any actual out-of-door experience of the disease. Hence conclusions have been drawn from tabulated statements which, when tested, have been proven to be fallacious. Cholera certainly prevails, in excess, on the margins of rivers where there are large sea-port towns, having aggregated, badly housed, immoral, and closely-packed populations; not, however, because it has any special preference for rivers as rivers, but because the element of human life is there. The same may be said as to stratification and elevation. Cholera may select low, wet, sodden, and corrupt subsoils occupied by a dense population. But where there are populations at high elevations zymotic diseases at times prevail, as both cholera and yellow fever have occurred in tropical climates at three and four thousand feet above the level of the sea. Then, as to stratification, a French commission, some years ago, came to the conclusion that cholera could not prevail upon granite. The question was put "Have you, in France, dense populations living on granite?" the answer was "No;" the reply then was "Few people, little or no cholera." Facts, when obtained, clearly shew that to have an epidemic you must of course have population, and there must also be a something in the air breathed, in water drunk, and in the subsoil, or on the surface, out of which cholera can generate when its spark, as in the case of the gunpowder illustration, is applied. But in all ages, and in all cases, where we

have the records, as a rule excess of dirt and excess of disease have been and are associated, whilst, in wide-spread and specially fatal epidemics, there have been other conditions, such as a preceding drought and famine, or a series of wet and cold seasons, affecting and corrupting vegetation, bringing on disease in cattle and men. Devastating wars have ever brought on famine, fever, plague, sweating-sickness, cholera, and death in excess.

Having indicated a few of the probable causes of cholera, let us see if simple remedial measures can also be indicated. Modern sanitary science may dictate for cities *main sewering* and *house draining*, with *improved water-supply*. But will such costly works when executed and left alone prevent cholera? we fear the reply must be "Certainly not," they are its foundation; but without other costly works of street-forming, paving, channelling, and persistent continuous good scavenging, most of the expenditure may have been wasted, as disease will continue to haunt defective and overcrowded room-tenements and unventilated houses. In some large seaport towns the poor live below the ground water-level; but in cities like Glasgow, Edinburgh, and Dublin, the poor live in tenement-houses and attics, so that sewering, draining, and scavenging is of little avail unless something further is done in the way of excreta removal, water-supply, and cleansing. In Dublin there are main-sewers and drains with a full supply of water for the better classes; but, at the time of my inquiry (1879), for the poor who lived in room-tenements, there was no useful drainage, and practically no useful supply of water. There was no privy accommodation for the occupant of a room in a Dublin tenement, and there was no water but at an external stand-pipe, situate at a distance, involving labour to fetch and carry. A medical officer, when asked how the sick poor managed in the long nights of winter, replied "They use any utensil handy;" and when further asked as to their supply of water in the day time, the reply was "a use of the same vessel for the water." But Dublin is not by any means exceptional, as the town-houses, room-tenements, and country-cottages all over Great Britain, as also, so far as my reading goes, over every portion of the world which is inhabited, are more or less filthy and swarming with vermin, because overcrowded, uncleansed, and underventilated. Of a truth, this question of house accommodation for the poor is the question of questions both for philanthropists and for statesmen, as here are the breeding dens of the roughs of all countries, nations, and tongues, the seed-beds of disease and revolutions.

The saying that "cleanliness is next to godliness" must

not be taken as an axiom which cannot be disputed. That cleanliness has not been and is not now, in many countries, considered necessary to godliness, religious ceremonials, both heathen and christian, amply prove. Nations professing Christianity do not to this day practise cleanliness as ordained by Moses, and explained in Leviticus. But the Levitical laws,—which inculcate cleanliness,—indicate the existence of filth and filthy habits amongst the populations for whom they were devised. The Jews, as a nation, were not road-makers or bath-builders, as were the Greeks and Romans in their day of governing power; neither have we in Great Britain public baths which can rank with those which existed in Imperial Rome, though recently baths in private houses are becoming common, and public baths and wash-houses have been and are being established by our principal municipal authorities.

In mediæval times Christianity became answerable for several forms of insanitary practices; as, for instance, intramural interments to an extent perfectly shocking. Burials of the dead took place in churchyards and within churches, in the subsoil and in vaults, to an extent which seems almost incredible. Churches which, when first erected, stood on the surface of the ground, have, during the lapse of time, by repeated burials, assumed the characteristics of cellar-dwellings, the burial-grounds having been raised by old coffins and human bones several feet in height above the original level. Within the body of these old churches vaults have also been constructed and coffins piled tier above tier, until the lower strata has been crushed by the weight above, and the vault-floor has become covered with a mass of putrid human remains. The Burials' Act passed by Lord Palmerston has caused old burial-grounds to be closed and new cemeteries to be established, so that this form of pollution has been diminished.

In India at this day dirt and holiness are in alliance; in food, and drink. Take the following extract from Reports made to the Government of Madras (1882). The description refers to certain religious rites performed by pilgrims at certain temples or shrines.

"The pilgrims depend almost entirely for their meals on the Temple Prasadum, which is in a sanitary point of view anything but satisfactory. This sacred meal, which is offered for sale at a very cheap rate, is quite unfit for human consumption. One-third of this meal is composed of some dirt and remnants of obnoxious insects. The Prasadum is also composed of unboiled or half-boiled rice, not clear of the bran, gravel, or grit, and the cakes are made of the same materials, with the addition of old, and rotten ghee. The cakes are kept for days before they are

consumed; it is, however, obligatory on the part of every pilgrim to eat a portion, at least, of this sacred Prasadum, on account of its being an offering to the deity, and it is a sacrilege on the part of anyone even to examine the same whether it is good, and blasphemy to say that it is bad."

The water used by the pilgrims is from a tank which has been used by pilgrims for years, for washing, bathing, and drinking; thus, it is very injurious to the health of the pilgrims.

The shrines of saints are numerous over the whole of India, and the ceremonial practices are for the most part dirty.

High-caste does not in all cases denote purity, but rather rank prejudice. High-caste natives will not wash in water filtered by Europeans, nor drink it, but must have tank or river water, however polluted and dirty. A native servant was observed partly to fill his skin bottle at a Calcutta filtered-water stand-pipe, and then go to the nearest puddle to fill up the remainder. When asked what he did that for, he replied, with a grin, "Making Ganges water for master."

In this Address, I may be expected to offer some practical remarks on the most recent advances in domestic sanitary science.

It it is now some thirty years since I first prepared a set of Suggestions for the instruction of Sanitary Engineers, which have been accepted and applied in Great Britain and on the Continent, in British Colonies, in British India, and throughout North America. As I have recently revised these Suggestions, I propose to refer to them in this Address, to give it practical value.

Houses should stand on a dry subsoil, and, in all cases, for the cottage, as for the palace, the area within the walls should be covered by a layer of cement concrete.

Sites for houses should not be dug into the side of a hill, unless the subsoil is drained, and the main-walls are effectively isolated by a ward or wide area from the high ground behind.

All house-walls should, at the foundation, or immediately above it, have a damp-proof-course to prevent rottenness, which leads to the Levitically described leprosy.

Sewers and drains should not be formed within the basement of houses or buildings, private or public, small or large.

To every room in a house there should be means for fresh air ventilation.

To every room to be occupied, day or night, there should be means for external daylight.

Dry refuse should not be stored near any dwelling-house, but should be removed at short intervals; refuse liable to become

putrid should be removed at once, and there should be unceasing day by day scavenging.

Villages, where the cottages are apart, cannot with advantage be sewered as houses in towns are; but they may be surface-drained, and have earth-latrines, to be cleansed each week by a paid scavenger. The payment of one or more shillings per week to a selected resident labourer or more in proportion to the number of cottages.

A clean water-supply is necessary for country cottages. Springs of water may, in some cases, be brought from a distance cheaply by pipes to the centre of the village. The economy of such process may be thus illustrated:—A gallon of water weighs 10lb. Five gallons of water weigh 50lb., and 365 times 50lb. for one year, and for 50 cottages in a village, would require this weight, with the weight of the can or bucket added, to be carried from any spring. The total weight being about 900 tons. This water, if piped, will flow to any convenient point and save to the villagers so much labour. This is a question for the consideration of Boards of Guardians and Landlords. I have recently seen in North Wales, on the estate of H. D. Pochin, Esq., J.P., several small isolated farm-houses fully supplied with water brought half a mile by a pipe ½ inch in diameter.

Town-sewering and house-draining are too complicated in character to be fully described in an Address such as I now deliver.

A water-supply to a town should be general. The source should be pure. The water (unless from a spring) should be filtered and stored in covered reservoirs. The supply should not fall below 15 gallons per head of the population; it should be at high pressure and constant service. Hand-carried supplies should not be tolerated. There should be full and ready appliances for fire-service.

It is practicable to take a supply of water into every yard, every house, and every room-tenement, and to supervise and manage these services so as to reduce waste and bring about economy. This, however, can only be done by unceasing supervision.

One difficulty to be contended with will be the thoughtless improvidence of the poor, and in some instances their mischievous disposition and dishonesty, as pipes of lead may be stolen. Wrought-iron-tubes may, however, be used for house-services, as they are both cheaper and stronger than lead, and the metal, having no value, will not be stolen. And water under pressure, if mischievously tampered with in any tenement, will be so disagreeable that those who wilfully liberate

it will soon close the tap, or, if damaged, cry out for repairs, and will not again readily bring upon themselves the flooding and trouble. There are many towns in England where each cottage has an independent service of pure water at its own taps, constantly on, at a rent-charge of one shilling and even less each quarter.

Where water is brought in there should be drains and sinks to remove the waste-water. These sink-pipes should not in any instance enter drain or sewer direct, but deliver outside over a small gulley-head connected with a drain.

Town-sewering, sewage-utilization, and river and stream purification, are complicated questions in which there have been many mistakes, and out of which has arisen much litigation; they cannot be discussed in these brief remarks.

The true purpose of town-sewering should be to remove all waste-water as generated; to insure a dry subsoil, and so to dispose of sewage as not to cause nuisance.

Town-sewering is a modern science now in the course of maturing, and there are already several volumes published on the subject.

There were drains and sewers in remote periods, but only for special purposes—as to remove waste-water from temples and palaces—in Roman cities there were, however, town-sewers; but even in Rome, and in Roman cities, houses were not drained systematically. We do not find any such remains, which we should do if they had ever existed.

The extent of the Roman Empire is better known by ruins of buildings and fragments of buried pottery than by any written records; but amongst these ruins we do not find street-sewers and house-drains such as will be found by antiquarian researches at some future day under the mound—sites of ruined and overthrown British and European towns.

Main-sewering, as now inculcated and practised, only dates from about the year 1845.

Dr. James Johnson, an eminent physician of London about the year 1829, returned from Rome, and made himself acquainted with the then main-sewers of London, and, in a written description, remarked as under:—

"If the arms of the Cloaca-Maxima extended to many or even all the streets of the Eternal City, the purification of Rome, by means of common sewers, can have no comparison with that of London. Neither in ancient nor in modern times did the sewers of the street communicate with the houses except in very few instances."

The oldest sewers in English, Scotch, and Continental towns

were arched-in watercourses—or substitutes for polluted ditches—excretal and other refuse being thrown out on to the street surface; which, if paved, was of the rudest character, uneven, and full of holes. The floors of the houses bordering such lanes and streets were littered with rushes; there was no systematic scavenging, so that house-floors, lanes, and streets were covered with a layer of putrid garbage; and it was in such towns, lanes, streets, and houses that plague (the black death) found its victims. Many continental and eastern towns are in this condition at present—hence excess of disease always, and at intervals plague and cholera.

Great mischief was done about the year 1850 by the chief engineers of England reporting on the main-sewering and draining of London, where large sewers and large tributary drains were considered right and proper, and were consequently recommended for all places. The report containing this recommendation, and denouncing a use of earthenware pipes for sewers, was distributed over the continent, and was made a text-book by some engineers. Hence the large sewers of Paris and Brussels. The law was laid down that main-sewers must be sufficiently large for men to enter, and the bottoms must be flat, to enable men more readily to cleanse them. No tributary house-drain was to be less in diameter than twelve inches, and must be formed of bricks.

About 1852 I drew up fresh rules for main-sewering and house-draining, recommending that sewers should be proportioned to the special work they would be required to accomplish.

Natural watercourses were not, as in old Rome and in the City of London, to be formed into sewage-conduits.

Surface-water was to be as much as practicable discharged by the ordinary watercourses at and over the surface.

Neither sewers nor drains were to be laid within the basements of houses.

House-drains were to range from four to six inches in diameter, and were in all cases to be of earthenware-pipes or of cast-iron.

The main-sewers were to be laid in right lines and have true invert gradients; at changes of line or gradient, manholes or lampholes were to be formed, with moveable covers on the small sewers, and side-entrances on the largest class of sewers; these arrangements are to facilitate inspection and cleansing by flushing. Sewers and drains to be fully ventilated.

Any town sewered and drained on these principles is, for all time under the inspection of the surveyor. The sewers being true in line, can, from manhole to lamphole be seen through. At the surface, the line of sewer can be sighted from manhole to lamphole, so that the surveyor knows exactly where to sink to find a side-junction.

In the modern sewers side-junctions are to form part of the first construction, so that house-drains may join without any charge of any sort for making such junction.

Under the old system of sewers no line was kept, but the trenches were opened out in short lengths, and the sewers were constructed irregularly, both in line and gradient. Side-junctions were not formed, neither are they formed now on some of the metropolitan parish sewers, which are not under the general law, but the sewer is broken into, and the builder pays a fine for making the junction which ought to have been ready for use as part of the original construction. One effect has been that hundreds of large west end houses in London have never had the sewer opened to make the house-junction; so that the result has been house basement-flooding, typhoid fever, and premature death.

It may reasonably be thought that this mal-arrangement only needed to be pointed out to be remedied, but, unfortunately, prejudice and pocket influence are not easily got rid of. Truth has a slow growth, whilst ignorance is a weed which strikes a deep tap-root, and is not easily destroyed.

Sewer and drain-flushing with water is necessary to preserve these conduits clean. The Automatic flushing-tank must therefore be used for cleansing drains and sewers. These flushing-tanks—the invention of Rogers Field, one of the leading members of this Institute—have, therefore, become an absolute necessity. They accumulate any water turned into them up to the capacity of the tank, which may be from 50 to 500, or even 5,000, gallons, when, without further intervention, the entire volume of water is liberated at a regulated speed to flush the sewers or drains connected. The tank after each discharge fills again, and repeats the flushing operation at regulated intervals. Service-boxes (small tanks), for flushing water-closets and urinals, are constructed on similar principles.

Sanitary science is progressive. It is being studied by engineers both in Europe and in North America. In design and execution there are improvements, and, in some instances, the opposite. The complications connected with town-sewering are, however, so many and so various that definite rules to fit all places cannot be formulated. The problem cannot always be in the form of a rule-of-three sum; that is, rainfall, area, and main sewer capacity.

A sanitary engineer should, of course, be a meteorologist and a geologist; but then, why not also a botanist, as sewage developes strange growths. The engineer will study meteor-

ology to learn the laws of the seasons; times, and volume of rain falling, not however to learn how large the sewers must be to remove the greatest volume of water falling in the least time, but how this water has passed away heretofore from the surface to be sewered, and with what effects.

Engineers, having much practice, will deal with each area specially, and construct their works so as best and most cheaply to accomplish the desired purposes; namely, to receive and remove waste-water and human excreta to some outlet or outlets, where they may be made harmless. Some engineers have thought that the heaviest known rainfall of a district must be provided for; hence, calculations have been made as to capacities of sewers to remove some exceptionally heavy volume of rain within the hour; but if this rule were worked to; main-sewers even in our climate,—for such populations as Birmingham, would have to be as large as railway tunnels. And for cities in India, such as Calcutta, Bombay, or Madras, main-sewers of the dimensions of railway tunnels would not serve; because rain occasionally falls at a rate of one inch per hour for many hours in continuance. The rule may appear absurd to those who have not studied the subject: namely, the heavier the rainfall, the less the capacity of the main-sewers should be, as, during the period that such heavy rains continue, the entire surface is swamped—sewers, drains, and streets being alike under water.

In countries subject to these heavy falls of rain, there may be, and usually are, long intervals of excessive heat and dry-weather, when at such times large sewers could only have a small volume of highly-concentrated sewage flowing through and evaporating rapidly, leaving sewage-sludge to putrify and give off deadly gases. Sewers and drains in tropical climates must therefore be confined, in cross-sectional dimensions, to moderate volumes not exceeding from 50 to some 150 gallons per head of the population. House-drains in no case need exceed four inches in diameter; and for establishments containing one thousand persons, a drain of twelve inches in diameter will be sufficient.

In England, some towns having populations up to ten thousand have outlet-sewers from 15 inches to 18 inches in diameter, and these sewers have been working during the last thirty years, and have neither choked nor burst. Surface-water has not, however, been admitted. For valley-lines down which in former times flowed surface-water—small brook courses—the culverts must be of capacity to carry off flood-waters, there must also be overflows to the river, or there must be pumping-power to lift and discharge such storm-water above flood-level. But in these cases these surface-water-channels

ought not to receive sewage. This should be removed by intercepting-drains.

This is a most important law which ought never to be disregarded; namely, do not enclose natural watercourses for main-sewering purposes, because the volume of surface-water flowing down a small brook will be dry, or nearly dry, for long periods; whilst in storms it may be an angry rushing torrent, so that during all dry periods, sewage if turned in would stagnate, evaporate, and leave all the slimy deposit to corrupt and become dangerous. That which is true for a tropical climate is in a lesser degree true under any other climate.

About the beginning of this century, when water-closets began to be used in better class houses in London, large coarsely made brick-drains ramified the basements of houses, and were connected with the flat-bottomed sewers. Sewage—that is, waste-water and excreta, was turned into the sewers, and becoming putrid, foul gases were generated, which pervading the houses, produced fevers to so serious an extent that house-drain connection with sewers direct was forbidden by Act of Parliament. Then came in the crowning evil—the cesspool. Houses having water-closets were ordered to sever the connection with the sewers, and cesspools were formed in yards and gardens, and beneath basements, to receive the contents of the water-closets; and to this day large foul brick drains and cesspools exist beneath large old houses in the metropolis and at mansions of noblemen and gentlemen throughout the country. How many premature deaths have been the result it is not possible to enumerate. This mal-arrangement was headed by Windsor Castle, where previous to 1849 there were within the basement 51 cesspools full and overflowing. At Gwydyr House—the first Board of Health in 1848—nine cesspools were found within the basement, all full and overflowing. At Bowood, the country seat of Lord Lansdowne, the entire basement was ramified with sewers, along which men could walk upright; all of them containing sewage deposit. This was the condition of the seat of Earl Grey at Hawick; then there were leaking brick-sewers and drains at Spencer House, St. James', London; at Marlborough House; the house of the Marquis of Bristol, St. James' Square; and at Claremont. These palaces and houses have, however, been thoroughly and effectively drained, and are now in good condition. The great colleges at Oxford were in a similar foul condition, but Christ Church, Balliol, All Souls, Jesus, and Wadham, have been fully drained at a cost of about £5,000; and some 800 of the lodging-houses have been improved, cesspools and foul drains removed, new water-closets and new drains put in, impure wells and pumps done away with, and

water supplied from the public works at a cost of some £15,000. The population of Oxford is about 40,000, and the rateable value some £200,000. The city has been sewered and drained, and pumping engines, with a sewage farm, established at a cost of not less than £200,000, so that Oxford has expended within a a few years this large sum of money on sanitary works. Cambridge, however, remains, with all its colleges, an undrained, river-polluted cesspool city. Up to about 1821, Paris was an undrained city of open privy cesspits and street pollutions, when an Ordnance was passed compelling the construction of water-tight and so-termed hermetically sealed cesspools, which continue to this day—nuisance creators and disease breeders. Neither London nor any other English town has ever been cesspooled as Paris is—that is, by such large and costly underground structures to receive human excreta, and as a consequence, the smaller English cesspools have been more easily got rid of; and, since 1848, they have been abolished by tens of thousands, so that London, at this day, stands sewered, drained, and freed from most of its cesspools, and is in this respect the most fully water-closeted and cleanest great city in the world. The work of entirely freeing the river Thames of sewage from Teddington to the North Sea, is merely a question of time, and there will be no further tampering with the question in London. The river Liffey must also be purified, and intercepting-sewers, having a sea outlet, will be the cheapest remedy. Every large town in Great Britain which is situate on the seashore, or on the margin of a salt-water estuary, at present sends the crude sewage direct to the estuaries or to the sea, and I know no valid reason against it. There are undoubtedly manurial elements of value in crude sewage, but if it must cost thirty or more shillings to utilize it by deposition with chemicals, or in land irrigation, to earn twenty shillings, and it causes no nuisance in the sea, I fail to recognise that to dispose of it in this manner at a less cost in rates is waste.

There are two modes by which inland sewage may be treated to prevent its becoming a nuisance—by disinfection and precipitation, and by broad irrigation. Now, according to the most recent experiments on a practical scale, continued over a series of years, it has been found to cost about £3,000 per annum to disinfect and precipitate the sediment from two millions of gallons of sewage per day, and the material obtained by precipitation has no paying value.

To treat the sewage of the metropolis, 160 million gallons per day, by chemical precipitation would cost, at a similar rate, about £240,000 per annum, and if carried on at the existing outlets on the Thames would create a great nuisance. £240,000

at twenty-five years purchase would equal a capital sum of six millions sterling, which had better be expended in taking the sewage to sea, rather than in further attempting to deal with it inland

For broad irrigation for London sewage there should be some 40,000 acres of land available, which, at £100 per acre, would cost four millions sterling, and might cost four more millions sterling to drain, form roads and irrigation conduits; but no such area of land could be purchased for so low a price, if preceding examples are to be a test. It has been found that when land for sewage irrigation purposes has been taken compulsorily, the price has, in some cases, mounted up to 150 years' purchase, and is never less than three or four times the ordinary selling or letting value for ordinary agricultural uses.

Inland towns and villages, as a rule, are obliged to secure land upon which to effect sewage purification. A long list of such towns and villages might be made out, the chief towns being Birmingham, Wolverhampton, Doncaster, Nottingham, Bedford, Leamington, Oxford, Reading, Warwick, and Croydon; to name all would be to incumber this Address with a long list of mere names, which can be found in Parliamentary returns, and which is being added to. There are other towns, such as Manchester, Leeds, Wakefield, and Bradford, where sewage is partially removed by sewers and partly by movable pails, and is treated by chemicals to cause precipitation. Irrigation, or filtration through land, produces the purest effluent, and, where suitable land can be procured at a fairly agricultural price, at the least cost to the community.

On the Continent there is sewage irrigation at Dantzig, which has been in use some years, and on a large scale it is being adopted in Berlin, where there are areas of flat surfaces of land with sparsely occupied sandy subsoils. To utilize sewage in the easiest and cheapest manner, the sewage should flow on to the surface without pumping. The subsoil should be porous, the climate should be dry, and have a large average of sunshine. From such land good management would produce a profit; but the question of sewage treatment and river purification is far too large to be further discussed in an opening address before a mixed audience.

Public baths, washhouses, disinfecting-apparatus, mortuaries, abattoirs, and a scavenging department are all necessary.

Public baths, washhouses, and disinfecting apparatus, should be as near the population for whose uses they are intended as may be practicable. They should be plain in appearance, inexpensive, and fitted up with efficient apparatus. If twenty thousand pounds has to be expended in any town, for the

benefit of the poor, it will be wiser to construct ten separate establishments placed where they are most wanted, rather than to erect one or two imposing-looking buildings to which the poor will not go—one reason being that they may be too distant. Examples of the utter breakdown of grand and costly baths and washhouses can be given, the people for whom they were intended would not use them, and so the money they cost was wasted.

Disinfecting-chambers should be attached to washhouse establishments, but isolated. That is, infected clothing should be received and washed apart. To stamp out contagious disease, burning or disinfection of infected bedding and clothing should be prompt, and it will be the cheapest process to disinfect, wash, cleanse, and restore the articles to the poor owners free of cost rather than retard the disinfecting process by using compulsion and demanding payment; as, in this case, there will be secretiveness and opposition; in the other case, ready compliance and thankfulness.

Mortuaries and ambulance-conveyances are an absolute necessity in towns, and should be a part of every establishment.

Public abattoirs, situate in open spaces, well drained and ventilated, are necessary. Private slaughter-houses ought not to be permitted.

A fire establishment is necessary; and in towns having a population exceeding 100,000 there may be several stations having electric communication with the head establishment.

Scavengers' Department. This, I consider, a prime necessity. All forms of scavenging should be under the absolute control of the municipality. There should be no private scavenging. To require householders at any time to scavenge their own premises is a remnant of barbarism, as when it is so left it never has been done, nor ever will be done. Scavenging should be at short intervals, and every spadeful of refuse should be cleared from the streets daily, being taken to some depôt. Such of the refuse as will burn should be burned, and other forms of refuse should be harmlessly disposed of outside the town or city. It will be a mistake to retain any refuse which is liable, by keeping, to become offensive, in the hope of selling it to make a supposed profit, as it is not the business of a scavenger to sell refuse, but to produce cleanness. In seaport towns, if refuse cannot otherwise be disposed of, it may be sent out to be sunk at sea in hopper barges.

Hospitals have been much discussed in recent years, and there have been great improvements, both in their construction and management; but with improvement there has been much extravagance. The prime purpose of a hospital should be to

afford temporary shelter to the poor and injured; and that hospital relief should be of practical use to the greatest numbers; the buildings should be cheap in construction, and the administration economical. It must surely be gross extravagance to build grand palace-like hospitals costing from £1,000 up to £2,500 per bed on which to treat a sick or injured man who never earned half the amount of his bed's rental when well; and to make matters worse, these extravagantly costly hospitals not to be wholesome.

An hospital to be of the greatest use should be on a dry site, well ventilated, and out in the open country. The construction should be cheap, the space large, the means for ventilation abundant. Warming by hot-water or steam may be admissible, but warming by heated-air transmitted through flues never; as it is not wholesome. Open fires and open windows will be best; and, in summer, verandahs for patients will be of great advantage. There are new hospitals near Berlin where the beds, with the patients, are moved into the open air on fine days throughout the summer.

For contagious diseases sheds of wood, which could be burned at intervals, would give the best results, and, if saving life is the prime use of any hospital, would be most economical. In such hospitals, even in surgical cases, the greatest bungler could not kill; whilst in some of the grand town hospitals, the most expert surgeons cannot save. This has been said by an eminent physician.

I do not attempt in this Address to enter at any length into the details of the reduction of disease by sanitary works and regulations. Sir James Paget, in his recent address before His Royal Highness the Prince of Wales, at the opening of the Health Exhibition at South Kensington, gave chapter and verse setting forth great money savings by prevention of cases of sickness and premature deaths. In all ranks of life, from the Royal Family to the poorest household, it has been shewn by Edwin Chadwick, C.B., the father of modern sanitary science, that there has within the last twenty years been on the entire population a great reduction in cases of sickness. In the Army and Navy the saving is from 17 in each 1,000 to 8½. In India from 69 per 1,000 to 20, and it is hoped further reductions may be accomplished.

In looking over the advances made in sanitary science, it must never be forgotten that to undertake and perfect good works is one thing, but that to maintain them good is the main thing.

It must also be remembered that sewers, drains, and waterworks are only means to an end—they are only good so long as they are sound, clean, and cared for. Again, the most complete

works of sewering and water-supply may leave untouched the slums and room-tenements; and these places may remain nests of contagious disease; out of which will continue to stalk the grim forms of Typhoid and Cholera. There are towns in England where sewers and drains have been formed and a good water-supply established, but where scavenging and single room tenement-inspection and cleansing have been shamefully neglected. The first should be done; the latter not left undone.

This question of sanitary improvement is an all-round question; it embraces the entire nation, as no rank or station is exempt from disease. Fever strikes down the highest in the land as the most lowly. A nation may be wealthy, and yet be unhealthy. Richly-endowed colleges may impart learning to the select few, but in town-slums vicious habits are much more profusely engendered; leading to vice and crime.

In the world there is no value but in human life, and human life has the greatest value when healthy and moral. It is the aim of the members of this Congress to induce improvement, to show statesmen and the public generally that the only safety will be in assisting to remove causes which lead to sickness, incapacity, and premature death.

The strength and glory of a nation is not in standing armies and ironclad fleets, but in the health, well-being, and contentment of the people.

The Lord Mayor—I have the honour to move a vote of thanks to our worthy President of the Congress for the very interesting and instructive address to which we have listened; and there is one incident, of which you have all been witness, that entitles Sir Robert Rawlinson, in an especial degree, to your vote of thanks, and that is that through temporary ailment he has been obliged to call on his friend Dr. Carpenter to continue the discourse which he, Sir Robert Rawlinson, with a chivalry and disregard to self, had intended to deliver. Gentlemen, that address, lengthy and instructive as it is, each of us can bring to our respective homes—this much of it at least—that is, the recommendation of personal cleanliness and the constant removal of filth from the neighbourhood of our houses. He has very wisely told us that the strength of a nation is in the health and well-being of its people—that health is only to be attained by attention to those sanitary laws which, if neglected, bring their own punishment. I feel very great pleasure in moving that the unanimous thanks of this distinguished assemblage be given to the President of the Congress, Sir Robert Rawlinson.

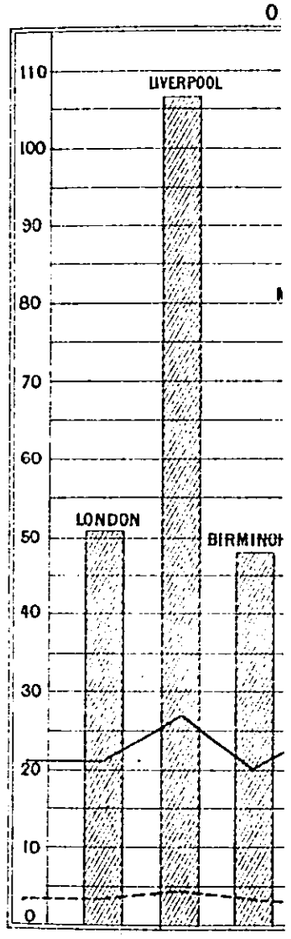
Dr. Moore, President of the College of Physicians.—I will not

occupy your time at this late period of the evening further than to follow what the Lord Mayor said about the very instructive address we have heard. But I cannot let this opportunity pass without saying that I know we in Dublin are very deficient; yet, if we look at Dublin impartially, drive through its purlieus, with which I am well aquainted, and then go back a quarter of a century, we must come to the conclusion, as I have done, that it is not in such a deplorable state as some people imagine. Gentlemen who know Dublin will remember the condition of the Coombe 15 or 20 years ago, and contrast what it was then with what it is now. There is no city anywhere where the artisans are housed in more cleanly homes, or where they have a better water supply, than in the Coombe. I know we have a great deal yet to do, but I think the sanitary authorities of Dublin have done their work fairly well during the last quarter of a century. I beg to second the vote of thanks.

Sir Robert Rawlinson, C.B.—I am extremely obliged for the vote of thanks that you have passed to me, through the intervention of his lordship, and before I separate from you I will say a few words. It is known to most of you, that I was sent by the British Government in 1879 as the head of a Royal Commission to enquire into the sanitary condition of Dublin, and to report upon its sewerage, its drainage, and the state of the river Liffey. I and my colleague, your townsman, Dr. MacCabe, sat a number of days, heard evidence, and made a personal inspection. The report has been published, and I may say this, my Lord Mayor, that your Corporation gave the Commission every possible support. We had access to every document that could give us instruction, and if we did not make a useful and practical report it was not because we had not the elements for such report put before us by the Corporation. I do not wish to say one word that would paint Dublin in colours blacker than it deserves, but it would be a very hopeless case if any of us, individuals or communities, reached that point when they thought that there was nothing more to be done. I may say whatever has been done in Dublin in the past, whatever money you have laid out in sanitary improvements, I am bound as an honest man to say, and I tell it to you in all sincerity, that you have a great deal left to do yet. I do not speak thus of Dublin specially, but I say it of every town community I am acquainted with, from London down to the pettiest place I have inspected. No town has yet been made perfect, and therefore the order of sanitation must be, "Unceasing work, unceasing care, and unceasing attention to securing cleanliness." Men labour from morning to night to accumulate wealth. If they laboured one-tenth part as earnestly to accumulate health they would be wiser and happier men. Sanitation (as I have said previously) is an all-round question, and the improvements connected with it cannot come from below—they must come from above. What is the use of you or me going into the slums of Dublin or those of any other city, and looking at the wretchedness, dissipation, and vice, and standing from morning till night appealing to these poor people and preaching at them to house, clothe and live better? They cannot build whole-

some houses in sewer and drain-polluted cities; and if the highest classes will not voluntarily forego some of the wealth they accumulate and give some attention to enabling these people to be healthier, happier, and to live better, then you may depend upon it there is a stratum of vice and misery now existent, which if made desperate by famine and neglect, would be quite sufficient to overturn all that is above, and if this state of things should continue for any length of time you may have social disturbances like the French revolution of the last century, which upset society from top to bottom; I hope we may all take this to heart, and strive to do the best we can for ourselves individually, as well as for the poorer neighbours who are about us.

DIAGRAM, I



Density of population [...]. G
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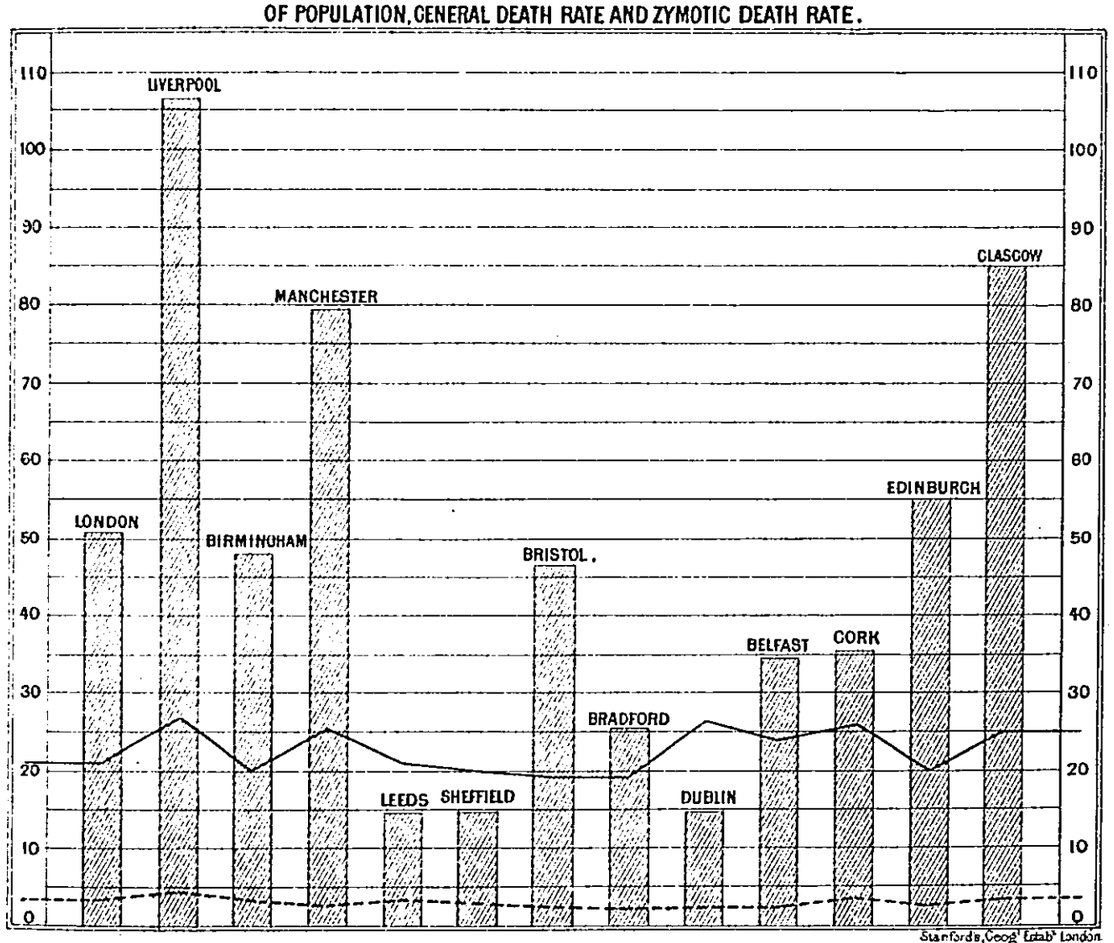
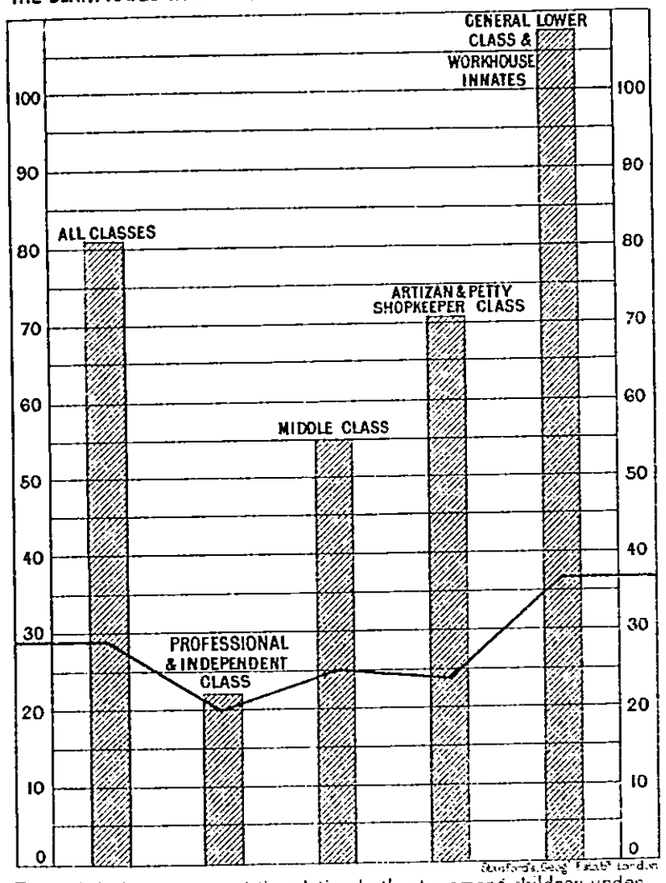
DIAGRAM, ILLUSTRATIVE OF TABLE IV. SHOWING THE RELATIONS BETWEEN DENSITY OF POPULATION, GENERAL DEATH RATE AND ZYMOTIC DEATH RATE.



Density of population ▨. General death rate per 1,000 ____. Death rate per 1,000 from principal Zymotics _ _ _ _.
The marginal figures represent in the case of Density of population, persons per acre. In the cases of death rates, deaths per 1,000 living.

DIAGRAM ILLUSTRATIVE OF PORTIONS OF TABLES V, AND VIII, RELATIVE TO THE DEATH RATES IN EACH SOCIAL CLASS OF THE POPULATION OF DUBLIN.



The shaded Columns represent the relative death rates among children under 5 years of age in each social class The continuous line, the death rates at all ages The marginal figures indicate death rate per 1,000 living.

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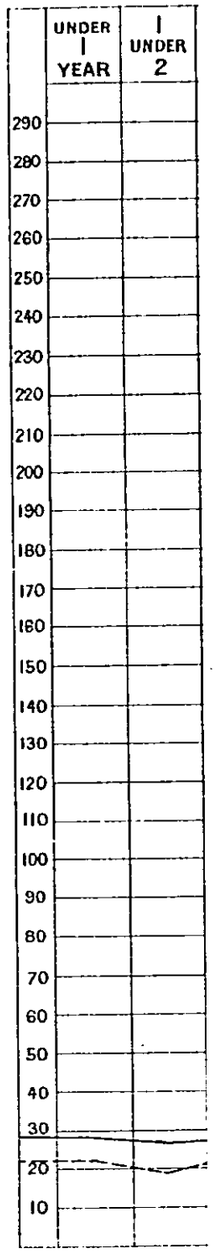

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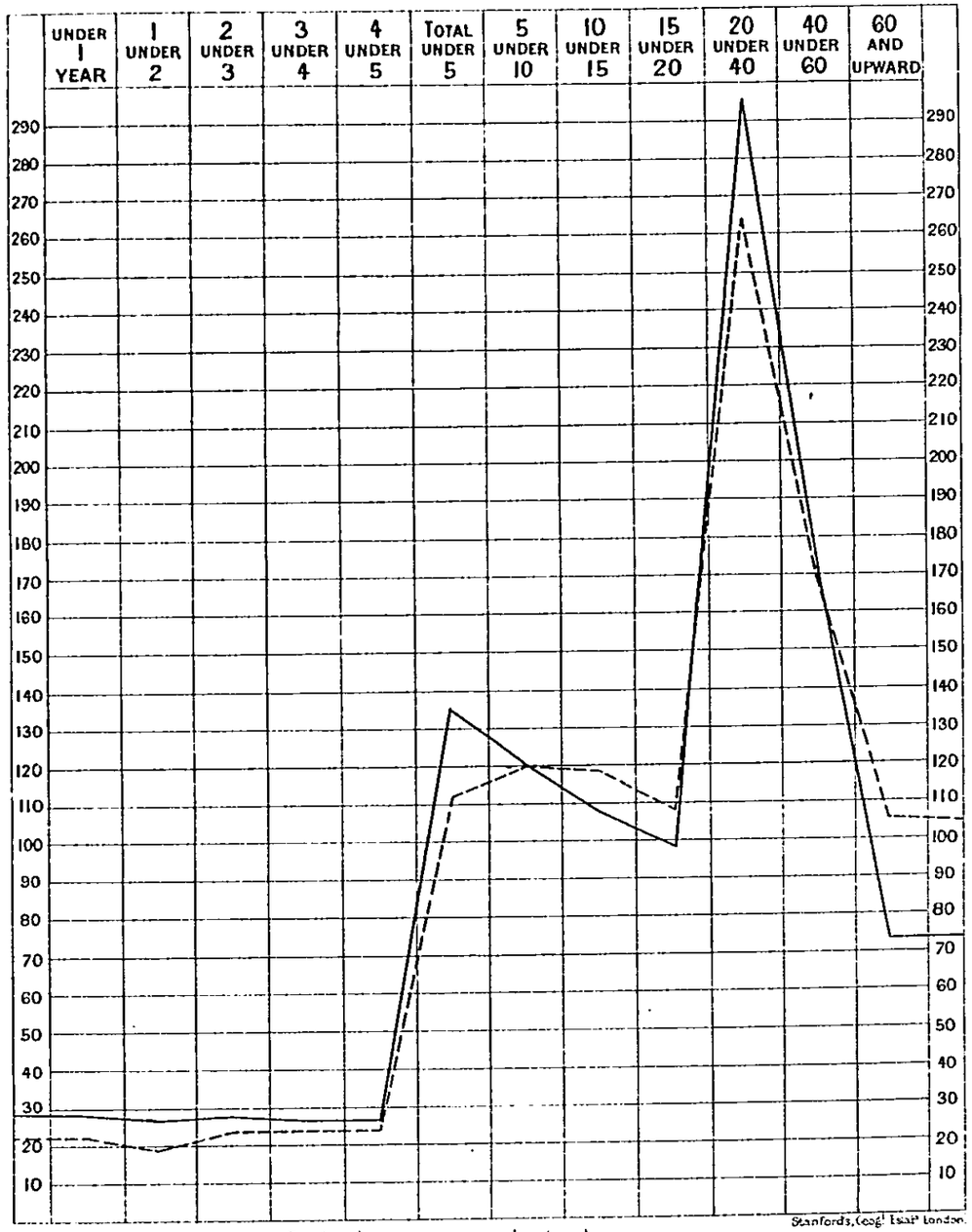
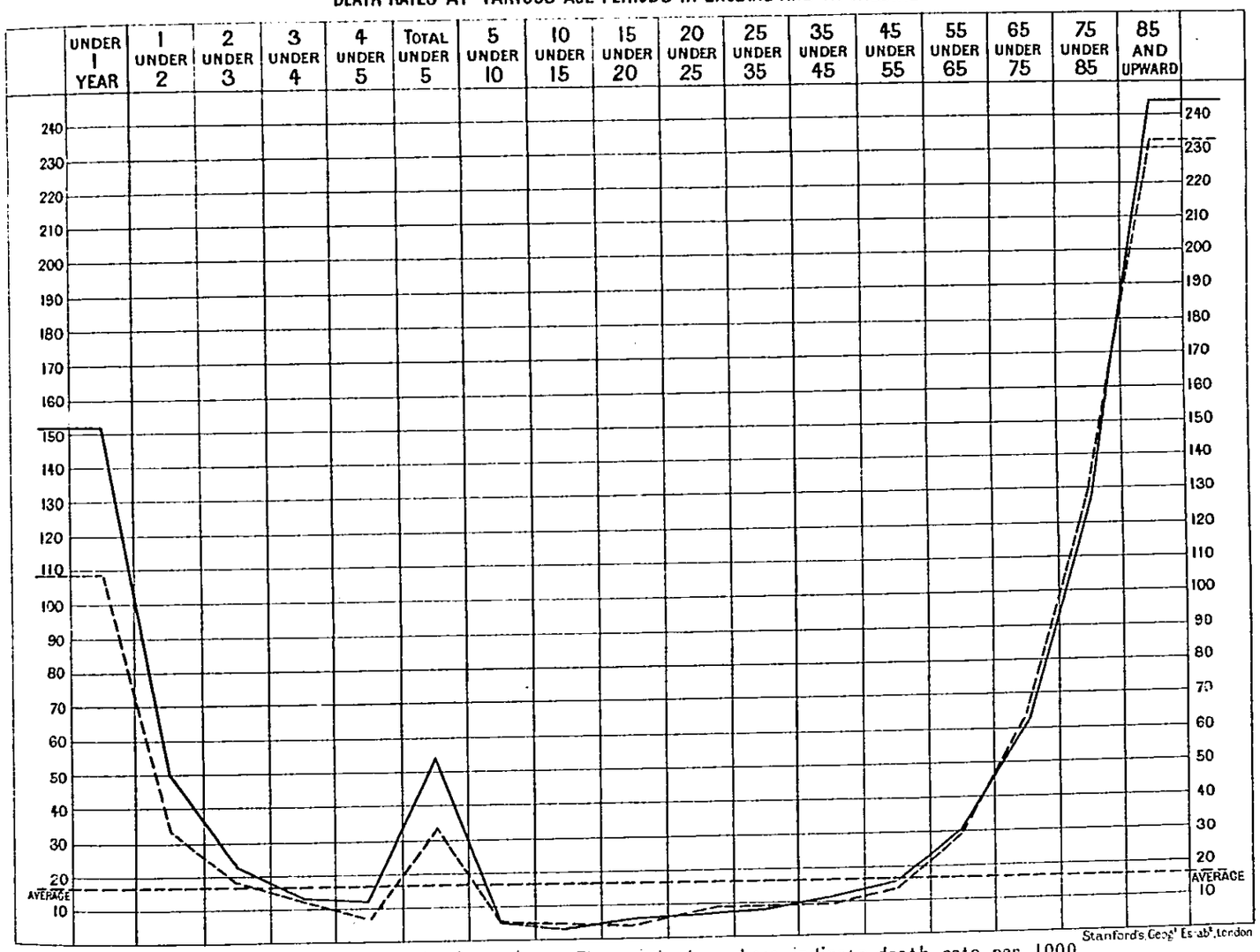
DIAGRAM, ILLUSTRATIVE OF TABLE IX, SHEWING THE RELATIVE AGE, COMPOSITION OF THE POPULATIONS OF ENGLAND AND IRELAND IN 1881.



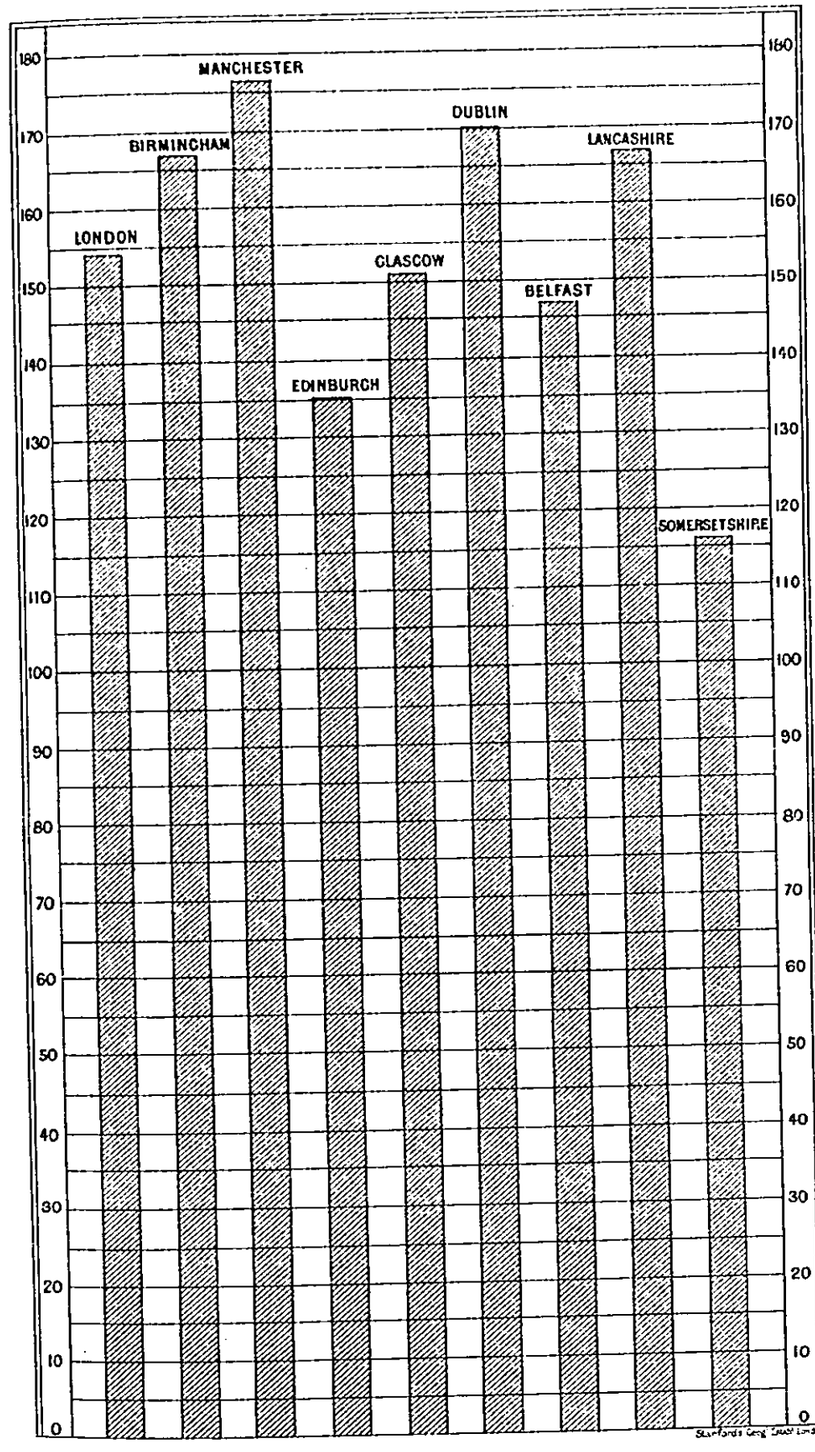
England ———. Ireland – – – – –.

The Marginal numbers represent the proportion per 1.000 of the population.

DIAGRAM. ILLUSTRATIVE OF TABLE XI. SHEWING THE RELATIONS BETWEEN THE DEATH RATES AT VARIOUS AGE PERIODS IN ENGLAND AND IN IRELAND.



England _____. Ireland - - - - - - . The marginal numbers indicate death rate per 1,000 living at each age period denominated at the top of the diagram.

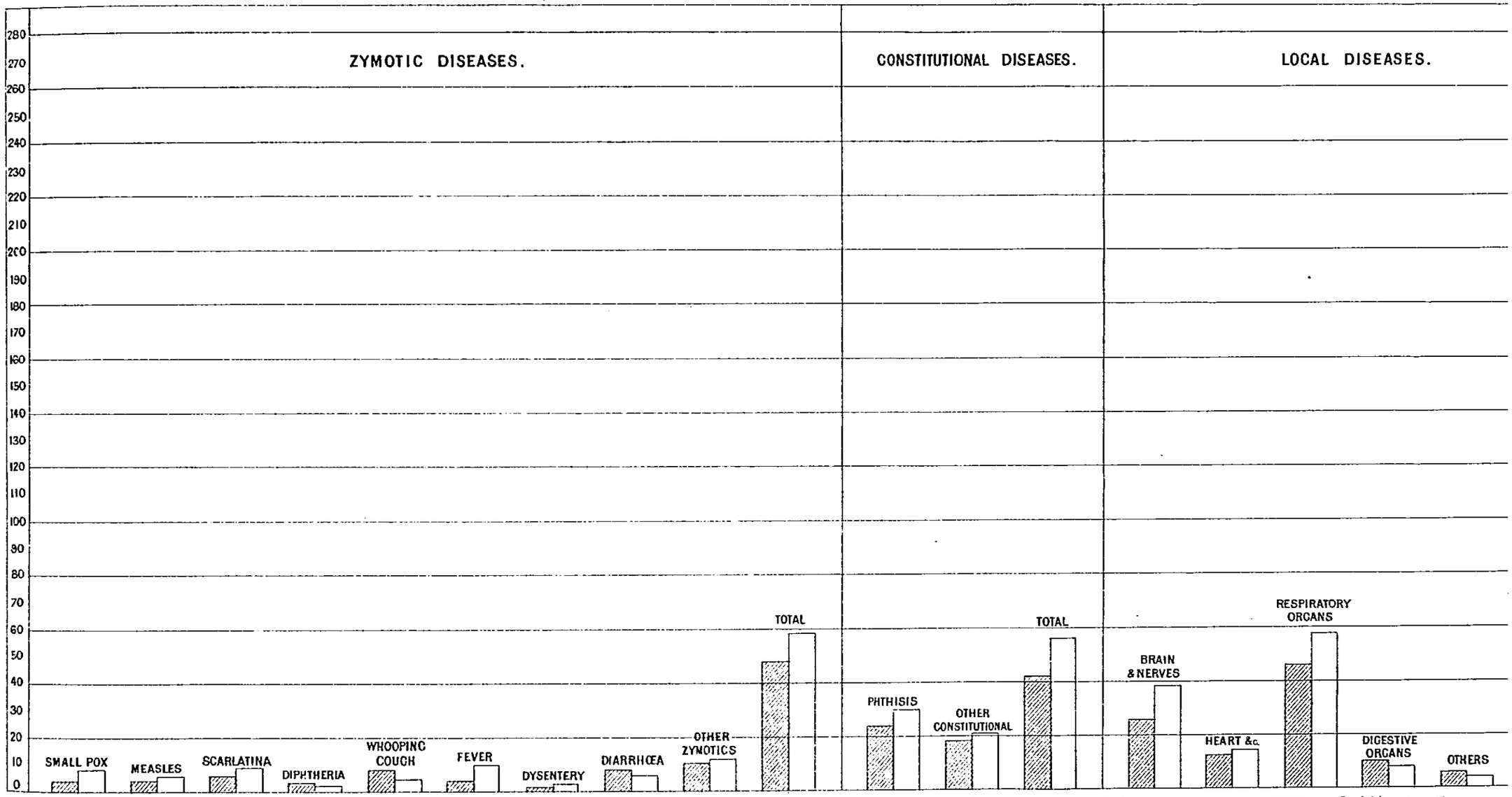


DIAGRAM

ILLUSTRATIVE OF STATEMENT PRECEDING TABLE XII. RELATIVE TO THE DANGERS TO INFANT LIFE IN LARGE TOWNS.

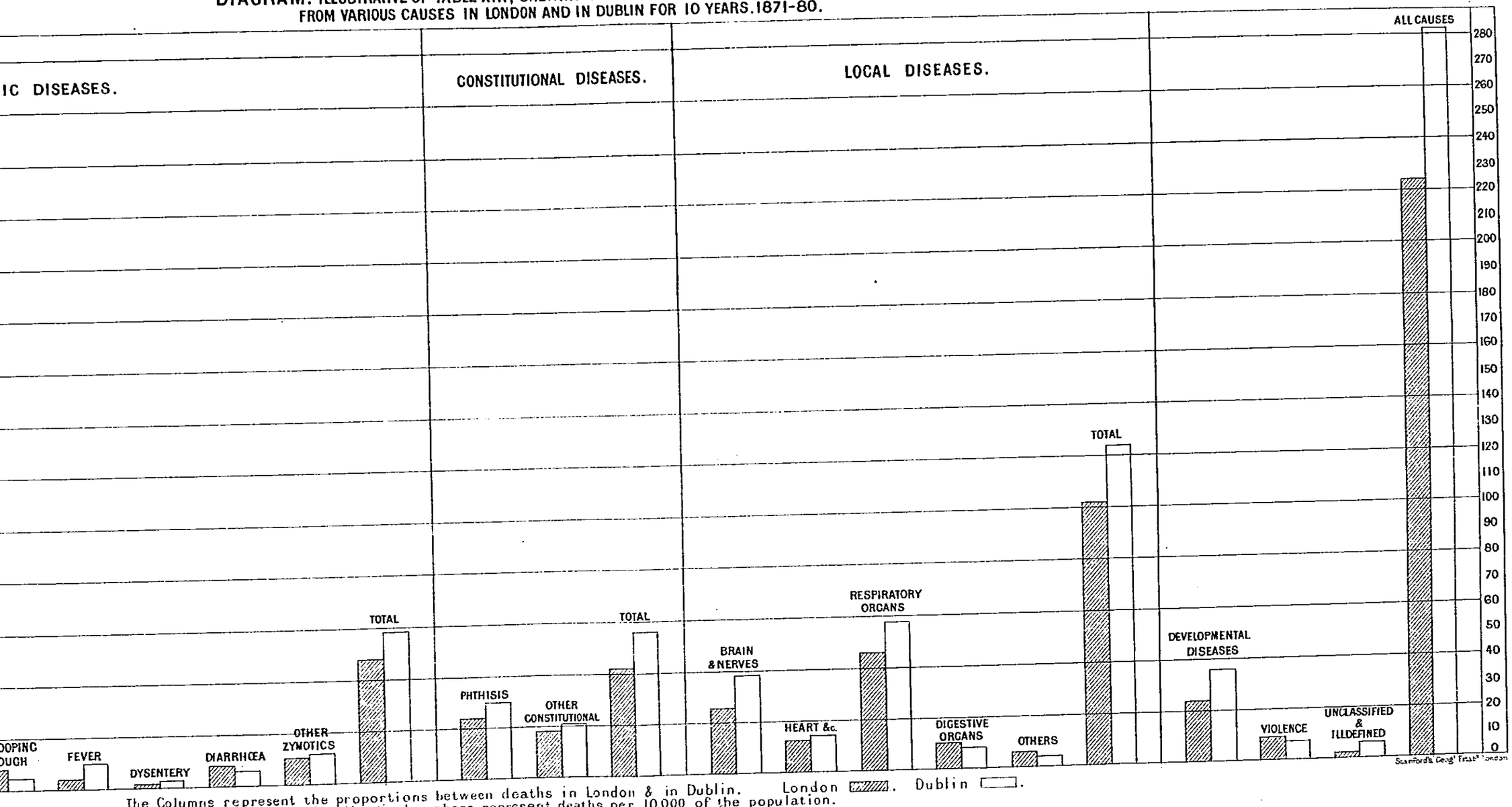
The shaded Columns indicate the proportion of deaths of Children under one year of age to Children born The marginal figures indicate the number of deaths under one year of age to 1000 births.

DIAGRAM. ILLUSTRATIVE OF TABLE XIII, SHEWING THE RELATIONS BETWEEN DEATH RATES FROM VARIOUS CAUSES IN LONDON AND IN DUBLIN FOR 10 YEARS. 1871-80.



The Columns represent the proportions between deaths in London & in Dublin. London ▨. Dublin □.
The Marginal numbers represent deaths per 10,000 of the population.

DIAGRAM. ILLUSTRATIVE OF TABLE XIII, SHEWING THE RELATIONS BETWEEN DEATH RATES FROM VARIOUS CAUSES IN LONDON AND IN DUBLIN FOR 10 YEARS. 1871-80.



The Columns represent the proportions between deaths in London & in Dublin. London ▨. Dublin □.
The Marginal numbers represent deaths per 10,000 of the population.