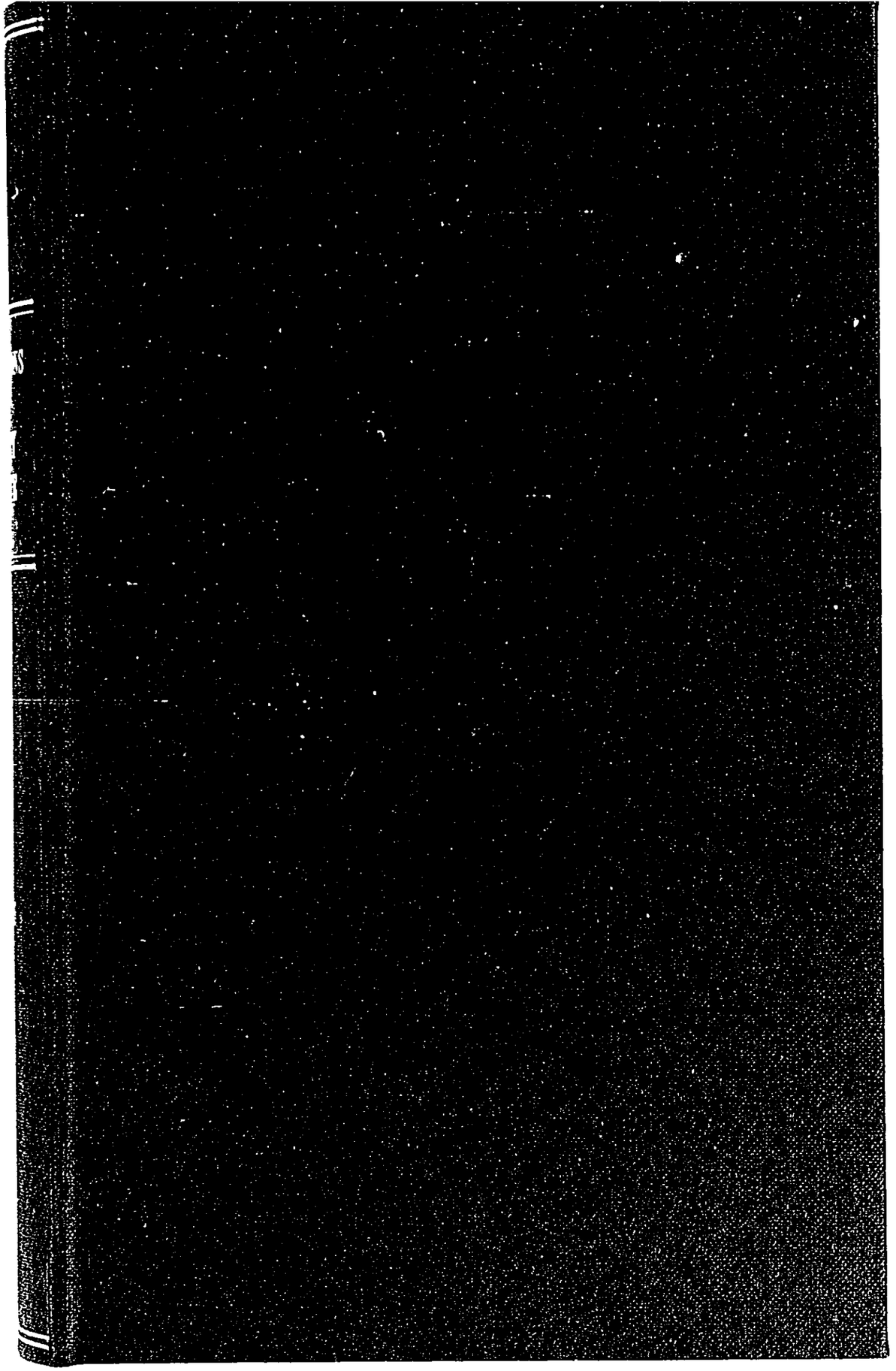


THE SANITARY INSTITUTE, INCORPORATED 1888.
SALUS GENERIS HUMANI.

1892.

TRANSACTIONS

OF

THE SANITARY INSTITUTE.

VOLUME XIII.

(Being Volume IV. of The Transactions published since the Incorporation of the Institute.)

CONGRESS AT PORTSMOUTH.

1892.

LONDON:
OFFICES OF THE SANITARY INSTITUTE, MARGARET STREET, W.
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CHARING CROSS, S.W.
—
1893.

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The Institute is not responsible for the facts and opinions advanced in the Addresses and Papers published in the Transactions.

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TABLE OF CONTENTS.

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PREFACE.

The present Volume is principally a record of the Congress held at Portsmouth; it is rather larger than usual, as it has been thought advisable to give either the text or abstract of the papers read at the five Conferences which were organised in connection with the Congress.

The Volume also contains the papers read at the Sessional Meetings, with the discussions that followed, and an address by Sir Douglas Galton, delivered at Worcester to inaugurate the course of lectures to Sanitary Officers organised by the Institute.

A full record of the two years' work will be found in the Annual Reports on pages 14 and 25, and particulars of the Examinations, List of Donations to the Library, and other matters of interest are given at the end of the Volume.

Congresses held by the Institute.

LEAMINGTON, 1877.

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CROYDON, 1879.

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EXETER, 1880.

President.—THE RIGHT HON. EARL FORTESCUE.

Presidents of Sections.

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

NEWCASTLE-UPON-TYNE, 1882.

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Presidents of Sections.

Section I.—Denis Embleton, M.D., F.R.C.S.
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" III.—Arthur Mitchell, M.A., M.D., LL.D., F.R.S.

GLASGOW, 1883.

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Presidents of Sections.

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" II.—Prof. T. Roger Smith, F.R.I.B.A.
" III.—R. Angus Smith, Ph.D., F.C.S.

DUBLIN, 1884.

President.—SIR ROBERT RAWLINSON, C.B.

Presidents of Sections.

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LEICESTER, 1885.

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YORK, 1886.

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BOLTON, 1887.

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Presidents of Sections.

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" II.—Prof. T. Hayter Lewis, F.S.A., F.R.I.B.A.
" III.—Prof. A. Dupré, Ph.D., F.I.C., F.C.S., F.R.S.
Conference of M.O.H.—Prof. W. H. Corfield, M.A., M.D.

WORCESTER, 1889.

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" II.—Henry J. Marten, M.Inst.C.E.
" III.—J. W. Tripe, M.D., F.R.C.P. F.R.Met.Soc.
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BRIGHTON, 1890.

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" III.—William Topley, F.R.S., F.G.S.
Conference of M.O.H.—Arthur Newsholme, M.D., D.P.H.
Conference of Inspectors of Nuisances—Alfred Carpenter, M.D., M.R.C.P. D.P.H.

PORTSMOUTH, 1892.

President.—SIR CHARLES CAMERON, M.D., F.R.C.S.I., D.P.H.

Presidents of Sections.

Section I.—Prof. J. Lane Notter, M.D.
" II.—James Lemon, M.Inst.C.E., F.R.I.B.A.
" III.—W. J. Russell, Ph.D., F.R.S.
Conference of Naval and Military Hygienists—Inspector-General J. D. Macdonald, M.D., F.R.S.
Conference of Medical Officers of Health—Prof. C. Kelly, M.D.
Conference of Municipal and County Engineers—H. Percy Boulnois, M.Inst.C.E.
Conference of Sanitary Inspectors—Prof. A. Wynter Blyth.
Conference on Domestic Hygiene—Lady Douglas Galton.

THE SANITARY INSTITUTE.

FOUNDED 1876.—INCORPORATED 1888.

REPORT OF THE COUNCIL

Read at the Ordinary General Meeting, March 15th, 1892.

The rapid growth of the Institute, financially, numerically, and also in its public work and official recognition, which is almost unprecedented in the annals of any similar Society, has steadily continued during the past year, and the Council are glad to be able to present to the Fellows and Members a Report showing the increasing work and usefulness of the Institute, indicating as it does the larger share of public attention given to Sanitary matters.

SESSIONAL MEETINGS.

Sessional Meetings were held in February, March, and December. The following papers were read and discussed:—

"Model Dwellings in London, and Over-crowding on space," by Louis Parkes, M.D., D.P.H.

"The Prevention of Infectious Diseases," by Prof. A. Wynter Blyth, M.R.C.S.

"The Sewerage of Maldon, Essex, with some observations on recent practice in Sewer Ventilation," by R. F. Grantham, M.INST.C.E.

LENT LECTURES FOR LADIES.

A course of Lectures on Domestic Hygiene, especially intended for Ladies, was given during Lent by Dr. A. T. Schofield, and included the following subjects:—

"Domestic Treatment of Disease."
"Microbes."
"Physical Culture."
"The Care of Old Age."

The Lectures were well attended, and, at a Special Meeting held at the close of the Course, Her Royal Highness the Duchess of Albany presented Certificates to 22 Ladies who had written satisfactory reports upon the Lectures.

LECTURES FOR SANITARY OFFICERS.

Two courses of Lectures and Demonstrations for Sanitary Officers have been held during the year. The first course was held in February and March, and the second in October and November.

One hundred and sixty-one Students entered their names for these Lectures.

The sixteen Lectures comprised in the course were:—

"Ventilation, Warming and Lighting." Sir Douglas Galton, K.C.B., D.C.L., LL.D., F.R.S.

"Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale." Mr. H. Law, M.INST.C.E.

"Water Supply, Drinking Water, Pollution of Water." In the first course by Dr. Louis Parkes, and in the second by Dr. G. Reid, D.P.H., Medical Officer, Staffordshire County Council.

"Drainage." Prof. H. Robinson, M.INST.C.E.

"Sanitary Building Construction." Mr. P. Gordon Smith, F.R.I.B.A.

"Sanitary Appliances." Prof. W. H. Corfield, M.A., M.D. Oxon., Medical Officer of Health, St. George's, Hanover Square.

"Details of Plumbers' Work." Mr. J. Wright Clarke.

"Scavenging, Disposal of Refuse and Sewage." Mr. Charles Jones, M.INST.C.E., Engineer and Surveyor to Ealing Local Board.

"Infectious Diseases and Methods of Disinfection." Mr. Shirley F. Murphy, M.R.C.S., Medical Officer of Health for the County of London.

"General Powers and Duties of Inspectors of Nuisances." Mr. J. F. J. Sykes, M.B., B.SC., Medical Officer of Health, St. Pancras.

"Objects and Methods of Inspection." Mr. J. F. J. Sykes, M.B., B.SC., Medical Officer of Health, St. Pancras.

"Trade Nuisances." Prof. A. Bostock Hill, M.D., S.SC.CERT.CAMB., F.I.C.

"Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for Food." Prof. A. Wynter Blyth, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.

"Nature of Nuisances, including Nuisances the abatement of which is difficult." Mr. J. F. J. Sykes, M.B., B.SC., Medical Officer of Health, St. Pancras.

"Sanitary Law. English, Scotch, and Irish; General Enactments; Public Health Act, 1875; Model Bye-Laws, &c." Prof. A. Wynter Blyth, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.

"Sanitary Laws and Regulations governing the Metropolis." Prof. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.

Arrangements are made in connection with these Lectures for the Students to visit Works for the Treatment of Sewage, Refuse destruction, and other public purposes.

The Council desire to record their sincere thanks to the Lecturers for the great benefits they have conferred upon the Students by the preparation and delivery of these Lectures.

The Lectures have now been carried on for six years with marked success, but have hitherto been confined to London. In 1891, however, the Council in conjunction with the County Council of Staffordshire, established a similar but somewhat shorter course in Stafford. The Lectures were attended by forty-four Students, and their beneficial effect was clearly shown in the results of the Examination which followed the Lectures.

The Council are now arranging to extend these courses to several other provincial towns, securing, as far as possible, the co-operation of the County Councils.

EXAMINATIONS.

During the year two Examinations for Inspectors and one for Local Surveyors have been held in London, and Examinations for Inspectors of Nuisances have also been held at Birmingham, Manchester, Newcastle, and Stafford. At these Examinations 350 Candidates presented themselves for Examination as Inspectors of Nuisances, and eleven as Local Surveyors; 238 received Certificates, of Competency as regards their Sanitary knowledge to discharge the duties of Inspectors of Nuisances, and eight those of Local Surveyors.

Since these Examinations were first established forty Examinations have been held, and 1,493 Candidates have been examined, of whom 825 have passed the Examination for Inspectors of Nuisances, and 78 that for Local Surveyors.

The provincial Examinations have proved so successful and have been so much appreciated by Local Authorities and by Candidates, that it has been found desirable to considerably increase the number of centres at which they are held.

The importance of appointing duly qualified officers is now very generally recognized, and at the instigation of the Institute, a clause requiring qualifying Certificates for Inspectors was added to the Public Health (London) Act, 1891. The desirability of a Certificate

of Competency for Sanitary Inspectors is definitely recognized by the City Commissioners of Sewers, by twenty-six other Sanitary authorities in the metropolis, and by Liverpool, Manchester, Southampton, and sixty-one other authorities in the provinces; in the majority of these the holding of a Certificate from the Institute is one of the conditions of appointment.

The Council feel that this work of Examination in which the Institute has been engaged for the past fifteen years is now bearing good fruit, and the following reference to this work appears in the Report of the Mansion House Council on the Dwellings of the Poor: *

"The status of Sanitary Inspectors, or, as they are sometimes designated, Inspectors of Nuisances, continues to improve. To the Lectures and Examinations of the Sanitary Institute this is chiefly due, and in a lesser degree to the public demand for men with a little more proficiency and ability than satisfied Vestries formerly. The most captious critic would now find the test Examination severe and searching, and in most of the advertisements for Inspectors we have been glad to notice that the possession of the Sanitary Institute Certificate has been rigorously insisted upon. In any comprehensive measure that is brought forward dealing with Sanitary matters, it is to be hoped that a Governmental sanction will be given to this Examination."

It has frequently been represented to the Council that there are a number of clerks of works, builders' foremen, and others holding similar positions who are anxious to obtain a Sanitary Certificate, and that the Syllabus of the Examination for Inspectors of Nuisances does not correspond with their duties and requirements. To meet this growing desire the Council have now arranged, in conjunction with the Worshipful Company of Carpenters, an Examination suitable for the officers referred to, and this Examination will be preceded by a course of preparatory Lectures.

CONGRESS.

The Provincial Congress and Exhibition, usually held by the Institute, were omitted in 1891, on account of the meeting of the International Congress of Hygiene and Demography.

This Congress had arranged to hold its Meeting in London, on the invitation of the Sanitary Institute and the Society of Medical Officers of Health, and was presided over by H.R.H. the Prince of Wales, with Sir DOUGLAS GALTON, as Chairman of the Organising and Executive Committee.

* Dwellings of the Poor. Report of the Mansion House Council, for the year ending December 31st, 1890. (Page 29.)

A Special Meeting was held in the Museum for the reception of the Members of the Congress, and was attended by about 500 persons.

PARLIAMENTARY WORK.

The most important Sanitary legislation of the year was the Consolidation and Amendment of the Public Health Statutes relating to the Metropolis, and a number of suggestions and amendments were prepared by the Institute, and brought before Parliament in the House of Commons, by Sir Guyer Hunter and Mr. F. S. Powell: and in the House of Lords by the Right Hon. Earl Kimberley, Right Hon. Earl Fortescue, Lord Thring, Lord Basing, and others. Amongst the suggestions of the Sanitary Institute that were adopted by Parliament may be specially mentioned those relating to structural requirements of Cellar Dwellings, as well as the regulation already referred to, which requires that after January 1st, 1895, all newly-appointed Inspectors shall hold a Certificate of qualification, unless they have had three years experience in a London district, or in a town containing upwards of 20,000 inhabitants.

MUSEUM.

The re-arrangement of the Museum, which was provided for by the liberal gift of Mr. Rogers Field, has been successfully carried out, and many new and instructive exhibits have been added; such as a full-size sectional model of house-drainage, models of damp-proof construction, water-fittings, &c. A complete Catalogue has been prepared, and will be issued to members in the Volume of Transactions.

The Council have appointed Mr. W. H. Knight (who arranged the Museum and Catalogue under the direction of the Committee) as Curator, to continue the improvement of the Museum and to assist visitors in their examination of the various exhibits.

These measures have largely increased the usefulness of the Museum for the purpose of Instruction, and it appears to be more than ever appreciated by the public as well as by teachers and professors. The Museum is open free to the public, and about 11,500 persons have visited it during the year.

The Examiners of the Joint Board of the Royal College of Physicians and Royal College of Surgeons, the Army Sanitary Committee, and also the Professors and Lecturers to many of the London Medical Schools, have availed themselves of the practical advantages

afforded by the Museum; 39 classes have been held in it, numbering altogether 411 students.

The Council are glad to note that similar Museums are being established in several towns abroad, and applications for information and assistance are made to the Institute.

LIBRARY.

The use of the Library is steadily increasing; during the year there have been 546 readers.

333 volumes and pamphlets have been added to the Library during the year. A list of these will be found in Volume XII. of the Transactions.

EPITOME OF REGISTERS OF MEMBERS AND ASSOCIATES.

	Hon. Fellows.	Fellows.	Members.	Associates.	Total.
Dec. 31, 1890	28	151	423	329	931
Elected	—	+5	+59	+141	+205
Transferred	—	—	–5	–2	–7
Resigned	—	—	–13	–5	–18
Erased	—	—	–7	–13	–20
Dead.....	–1	–2	–7	–3	–13
Dec. 31, 1891	27	154	450	447	1078

The Council are glad to note this rapid and continued increase in the Institute.

It is with much regret that the Council have to report the death of:—M. Alphand, Hon. Fellow; R. B. Grantham, M.INST.C.E., and Prof. John Marshall, F.R.S., Fellows; W. Aldam, E. G. Banner, W. W. Day, M.D., D.P.H., J. T. Donald, L.R.C.S., G. K. Hardie, M.D., G. Moseley, F.R.C.S., and W. E. Steavenson, M.D., Members; Philip Cheek, Robert Slater, and F. E. Sleath, Associates.

FINANCE.

The Statement of Income and Expenditure for the year shows a satisfactory progress in the Financial Position of the Institute.

DOUGLAS GALTON, K.C.B.,
Chairman of Council.

E. WHITE WALLIS, *Secretary.*

9th March, 1892.

STATEMENT of INCOME and EXPENDITURE, for the Year ended 31st December, 1891.

Dr. | **Cr.**

Expenditure.	£	s.	d.	£	s.	d.	*Income.*	£	s.	d.	£	s.	d.
To Transactions, Cost of Printing, &c., less Sales and Advertisements—estimated	35	8	6				By Annual Subscriptions	643	14	0			
„ Sessional Meetings	19	1	0				„ Entrance Fees	91	7	0			
„ Lectures, Sanitary Officers	54	19	10				„ Life Compositions	63	0	0			
„ „ Domestic Hygiene	34	18	11				„ Fellowship Fees	26	5	0			
„ Examinations	711	10	1				„ Donations	9	8	6			
„ Illustrated List of Awards	4	0	6								833	14	6
„ International Congress of Hygiene	25	16	1				„ „ for Re-arrangement of Museum				250	0	0
				885	14	11	„ Lectures, Sanitary Officers	114	10	0			
„ Rent, Rates, Taxes, and Insurance	260	15	3				„ „ Domestic Hygiene	26	10	0			
„ Salaries and Wages	563	18	0				„ Examinations	1228	1	3			
„ Coals and Care of Offices	29	0	1				„ Publications—Farr's and Simon's—Profit on Sales	7	6	7			
„ Repairs and Alterations	77	9	5				„ Interest on Deposit	7	9	1			
„ Arrangement of Museum	250	0	0								1383	16	11
„ Library, Binding, &c.	5	19	11								£2467	11	5
„ Postage and Carriage	71	2	1										
„ Printing and Stationery	97	17	6										
„ Advertising	11	4	9										
„ Incidental Expenses	46	1	5										
„ Alfred Lass & Co., Auditing Accounts	10	10	0										
„ Office Furniture	17	12	0										
„ Depreciation of Leasehold	50	0	0										
				1491	10	5							
				2377	5	4	By Balance brought forward from last Account				2019	14	5
„ Balance for the year 1891				90	6	1	„ Profit on Year 1891				90	6	1
				£2467	11	5					£2110	0	6
„ Balance to be carried forward				£2110	0	6							

Examined and approved, ALFRED LASS & Co., Chartered Accountants, } *Auditors.*
MAGNUS OHREN, Assoc.M.Inst.C.E., }

March 7th, 1892.

GENERAL BALANCE SHEET, 31st DECEMBER, 1891.

Liabilities.	£	s.	d.	*Assets.*	£	s.	d.	£	s.	d.
To Subscriptions paid in advance for 1892	41	9	6	By Lease of Premises, 9 years unexpired				444	3	8
„ Examination Fees „ „	20	9	6	„ Library and Contents of Museum, estimated value				500	0	0
„ Exhibition Account Balance	14	4	8	„ Furniture and Fixtures, estimated value				100	0	0
„ Sundry Creditors	314	1	9	„ Transactions and Publications, estimated value	516	8	6			
	390	5	5	„ Farr's Works, estimated value	35	5	0			
Balance of Assets over Liabilities	2110	0	6	„ Simon's „ „	101	10	0	653	3	6
				„ Sundry Debtors—						
				Members' Subscriptions and Arrears	79	5	6			
				„ „ from old Societies	12	12	0			
				Fellowship Fees	10	10	0			
				Entrance Fees	33	12	0			
				Sundries	13	7	6	149	7	0
				„ Cash at Bankers				153	11	9
				„ „ „ on Deposit				500	0	0
	£2500	5	11					£2500	5	11

Examined and approved,
ALFRED LASS & Co., Chartered Accountants, } *Auditors.*
MAGNUS OHREN, Assoc.M.Inst.C.E. }

March 7th, 1892.

ADDRESS

By Sir DOUGLAS GALTON, K.C.B., F.R.S.,

Chairman of Council.

Read at the Ordinary General Meeting, 1892.

As by the rules of the Institute I am about to resign my position as Chairman of Council, I will take this opportunity of making a few remarks.

I became Chairman of Council of the Parkes Museum at the end of 1882, and retained the position until the Museum was joined with The Sanitary Institute.

I was made Chairman of Council of The Sanitary Institute in 1885, and I then urged on The Sanitary Institute the importance of uniting with the Parkes Museum.

I have always felt the great evil of the separation of Sanitary Associations into several bodies, each of which fritters away influence, whereas by union and a concentration of influence the power for good of the Association is largely increased.

The two Societies were amalgamated and incorporated as the Sanitary Institute in 1888, under the provisions of the Companies Act and the license of the Board of Trade.

Since that time the growth of the Institute has been steady and fairly rapid.

As an instance of this growth I may mention that at the time of the amalgamation of the two Societies they jointly possessed 754 members. The Sanitary Institute now numbers 1,100 members.

The annual income of the two Societies in 1883 amounted to £1,700. The annual income of The Sanitary Institute is now nearly £4,000.

The Library, which was in its infancy in 1883, has now become probably one of the best Sanitary Libraries in the world.

The Museum, which my friend Mr. Twining did so much to foster in the early days of the Parkes Museum, has now—partly in consequence of the increased funds at the disposal of the Institute, but very largely in consequence of the munificence of Mr. Rogers Field—become a very valuable aid to Sanitary Instructors, and it is largely resorted to by teachers,

and used by them as a place for giving practical instruction to their classes of students.

You all know that the object for which The Sanitary Institute exists is to foster and diffuse Sanitary knowledge, not that Sanitary Science is a new science; but our progress in that comfort and well-being which we term civilisation, has the effect of developing new contingencies, which alter the conditions regulating the application of Sanitary knowledge. Whether in town or country we are daily brought into contact with many problems of Sanitation.

The other day Dr. Louis Parkes gave us an interesting speculation on the deterioration of air in towns, and of water in the country.

The evils of our congested population meet us at every turn. If our progenitors had been properly educated in Sanitary matters our towns would not have been allowed to contain unhealthy localities; houses would not have been permitted to be built on damp unhealthy sites; buildings would not have been constructed so as to impede the circulation of air and the incidence of light.

Our town populations would not have been allowed to grow up herded together like the beasts of the field, without moral training or self-restraint, and our country population would not have been allowed to destroy the healthy conditions which surround them, by vitiating the pure air, and by contaminating the springs of pure water.

The Sanitary Institute is thus the direct outgrowth of the public need for Sanitary Education. And we have therefore considered that whilst our Museum and Library fulfil what may be termed our passive function, we must obtain progress by active measures.

Our active operations consist of our Lectures and Examinations, our Congresses, and our Exhibitions.

The Lectures to Sanitary Officers, which we commenced in 1885, were a necessary consequence of the Examinations which we had initiated for Local Surveyors and Sanitary Inspectors.

We soon found that it was useless to hold Examinations if the examinees had no opportunity of acquiring knowledge of the subjects in which they were examined.

The number of Lectures in the course for Sanitary Inspectors, which was twelve in 1885, has been increased to seventeen, and whilst we commenced by holding two courses annually in London, we have now extended these courses to other parts of England. We give Lectures at Stafford, Derby, Cardiff, Newcastle, Wakefield, and Norwich, with the support of the several County Councils.

The Examinations which follow these Lectures have been attended by continually increasing numbers. In 1883 there were twenty who came up for examination. In 1891 there were 361, and we have examined 1493 candidates since we first began.

Special Lectures have been given annually to ladies during Lent under the patronage of H.R.H. the Duchess of Albany.

Lectures on Hygiene have been given to medical men, and, as you have heard, we have now instituted Lectures and Examinations in conjunction with the Carpenters' Company.

But our Congresses and Exhibitions have as great importance as a means of educating the people as our Lectures and Examinations. The town in which these are held has generally been found to acquire thereby an impetus in Sanitation; for instance, at Worcester it led to the formation of a Local County Health Society, and in other towns has had beneficial results. Moreover, now a main feature of the Congress is the Conferences of Medical Officers of Health and of Sanitary Inspectors.

The Exhibitions have a real value. At these the newest improvements in Sanitary appliances are brought forward. The Institute has inaugurated a most careful system of judging the Exhibits by giving stability to its court of Judges; that is to say, while a gradual change in the *personnel* of its judges is made annually on a systematic plan, yet the larger number of Judges remain from year to year, so that there has been a uniformity in the principle upon which the awards have been based. An essential feature in judging articles for award is the practical testing of those exhibits whose merit cannot otherwise be determined.

I trust I have said enough to show that The Sanitary Institute may fairly claim to have done a great work of public usefulness during its comparatively short career.

This work has not been achieved without a great tax upon the members of its Council. The Judges and the Lecturers, who, with the Examiners, are the mainstay of the Institute, give their services gratuitously, and our success has been due to the earnest self-sacrificing spirit of the Council, as well as that of the Secretary and other officers connected with the management of the Institute.

I confess that I resign the Chairmanship of the Council with some regret, but I am fully consoled with thinking that it will be occupied by equally earnest—and probably abler—men; that the spirit which has hitherto animated the Council will continue to prevail; and that future years will register greater successes than those gone by.

ANNUAL REPORT OF THE COUNCIL

Read at the Ordinary General Meeting, March 8th, 1893,

SIR THOMAS CRAWFORD, K.C.B., M.D., Q.H.S., LL.D., IN THE CHAIR.

In presenting this Sixth Annual Report since the incorporation, and the Seventeenth since the foundation of the Institute, the Council are glad to be able to state that the rapid progress in the work of the Institute recorded in past years has been steadily maintained.

SESSIONAL MEETINGS.

Sessional Meetings were held in February and March. The following papers were read and discussed:—

"Refuse Disposal," by C. JONES, M.INST.C.E., Engineer to the Ealing Local Board, and J. RUSSELL.

"The Air and Water of London: are they deteriorating?" by LOUIS PARKES, M.D., D.P.H., Medical Officer of Health for Chelsea.

The meetings were well attended, and the papers, with abstracts of the discussion upon them, will be published in Vol. XIII. of the Transactions.

LECTURES FOR LADIES.

A course of Lectures on Domestic Hygiene, especially intended for Ladies, was given during Lent, as follows:—

"The Phenomena of Life,"
"Food and Dietetics,"
"Physical and Mental Training of Children,"
"The Hygiene of District Visiting,"
} by Dr. A. T. SCHOFIELD.

"The Effects of Posture on the Health of School Children," by the Rev. J. R. BYRNE, M.A., H.M. Inspector of Schools.

The Lectures were illustrated by Diagrams, Microscopic Specimens, Food collections, School Desks and Fittings, and by an exhibition of Physical Drill given by the girls of the Montem Street Board School, under the direction of Miss Allison.

Her Royal Highness the Duchess of Albany was present at all the Lectures, and at the close of the Course a special meeting was held, at which the Duchess of Albany presented the Certificates awarded to ladies who had written satisfactory Reports on the Lectures.

LECTURES FOR SANITARY OFFICERS AND STUDENTS.

Two courses of Lectures and Demonstrations for Sanitary Officers have been held in London during the year. The first course was held in February and March, for which 84 Students entered their names, the average attendance at the Lectures being 75.

The Lectures comprised in this course were: –

1. Ventilation, Warming, and Lighting. SIR DOUGLAS GALTON, K.C.B., D.C.L., LL.D., F.R.S.
2. Water Supply, Drinking Water, Pollution of Water. H. R. KENWOOD, M.D., D.P.H.
3. House Drainage. PROF. H. ROBINSON, M.INST.C.E.; Professor of Engineering, King's College.
4. Sewage Disposal. PROF. H. ROBINSON, M INST.C.E.
5. Sanitary Building Construction. P. GORDON SMITH, F.R.I.B.A., Architect to the Local Government Board.
6. Sanitary Appliances. PROF. W. H. CORFIELD, M.A., M.D.OXON., Professor of Hygiene and Public Health, University College, London, Medical Officer of Health for St. George's, Hanover Square.
7. Details of Plumbers' Work. J. WRIGHT CLARKE.
8. Scavenging, Disposal of Refuse. C. JONES, M.INST.C.E., Engineer to the Ealing Local Board.
9. Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for Food. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
10. Infectious Diseases and Methods of Disinfection. SHIRLEY F. MURPHY, M.R.C.S., Medical Officer of Health to the London County Council.

11. General Powers and Duties of Inspectors of Nuisances. J. F. J. SYKES, M.B., B.SC., D.P.H., Medical Officer of Health for St. Pancras.
12. Objects and Methods of Inspection. J. F. J. SYKES, M.B., B.SC., D.P.H.
13. Nature of Nuisances, including Nuisances the abatement of which is difficult. J. F. J. SYKES, M.B., B.SC., D.P.H.
14. Trade Nuisances. PROF. A. BOSTOCK HILL, M.D., D.P.H., F.I.C., Professor, Queen's College, Birmingham.
15. Sanitary Law. English, Scotch, and Irish; General Enactments; Public Health Act, 1875; Model Bye-Laws, &c. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
16. Sanitary Laws and Regulations Governing the Metropolis. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S.,
17. Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale. PROF. T. ROGER SMITH, F.R.I.B.A.

At the second course, in October and November, 128 students entered their names, the average attendance at the Lectures being 119.

The Lectures comprised in the second course were:

1. Ventilation, Warming and Lighting. SIR DOUGLAS GALTON, K.C.B., D.C.L., LL.D., F.R.S.
2. Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale. H. LAW, M.INST.C.E.
3. Water Supply, Drinking Water, Pollution of Water. LOUIS PARKES, M.D., D.P.H.LOND. Medical Officer of Health for Chelsea.
4. House Drainage. W. C. TYNDALE, ASSOC. M.INST.C.E.
5. Sewage Disposal. PROF. H. ROBINSON, M.INST.C.E., Professor of Engineering, King's College.
6. Sanitary Building Construction. H. H. COLLINS, F.R.I.B.A., District Surveyor for Eastern Division, City of London.
7. Sanitary Appliances. PROF. W. H. CORFIELD, M.A., M.D.OXON., Professor of Hygiene and Public Health, University College, London; Medical Officer of Health for St. George's, Hanover Square.

8. Details of Plumbers' Work. J. WRIGHT CLARKE.
9. Scavenging, Disposal of Refuse. T. DE COURCY MEADE, M.INST.C.E., Engineer to the Hornsey Local Board.
10. Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for Food. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
11. Infectious Diseases and Methods of Disinfection. SHIRLEY F. MURPHY, M.R.C.S., Medical Officer of Health to the London County Council.
12. General Powers and Duties of Inspectors of Nuisances. J. F. J. SYKES, M.B., B.SC., D.P.H., Medical Officer of Health for St. Pancras.
13. Objects and Methods of Inspection. J. F. J. SYKES, M.B., B.SC., D.P.H.
14. Nature of Nuisances, including Nuisances the abatement of which is difficult. J. F. J. SYKES, M.B., B.SC., D.P.H.
15. Trade Nuisances. PROF. A. BOSTOCK HILL, M.D., S.SC.C.CAMB., F.I.C., Professor at Queen's College, Birmingham.
16. Sanitary Law. English, Scotch, and Irish: General Enactments: Public Health Act, 1875; Model Bye-Laws, &c. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
17. Sanitary Laws and Regulations Governing the Metropolis. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S.

Arrangements were made in connection with these Lectures for the Students to visit the—

Sewage Disposal and Refuse Destructor Works, Ealing.
Beddington Sewage Farm, Croydon.
Model Dairy (Welford & Son).
Refuse Disposal Works, Chelsea.
Sanitary Depôt, Sewage Disposal Works, Isolation Hospital, Highgate.
Model Cow-House, Finsbury Park.
Wimbledon Sewage Farm.
Knacker's yard (Harrison & Barber).
East London Soap Works (E. Cook & Co.).
Disinfecting Apparatus (Washington Lyons), St. George's Hospital.

PROVINCIAL LECTURES.

Lectures in the provinces, which were commenced in 1891, have been greatly extended, and arrangements were made for Courses of Lectures to Sanitary Officers at the following Towns in conjunction with the County Councils or Corporations.

County Council of Derbyshire	Derby.
The West Riding County Council, The Yorkshire College, The County Boroughs of Halifax, Huddersfield, and Sheffield . .	Wakefield.
The Corporation of Cardiff	Cardiff.
The Corporation of Newcastle-upon-Tyne .	Newcastle-upon-Tyne.
The County Council of Norfolk	Norwich.
The Corporation of Liverpool	Liverpool.
The County Council of Worcestershire . .	Worcester.

620 Students entered their names for these Lectures. The total attendances at all the Lectures being over 7,000, or an average of 84 at each Lecture.

The courses at the various centres consisted of the following Lectures:—

DERBY.

1. Introductory, and on Ventilation, Heating and Lighting. SIR DOUGLAS GALTON, K.C.B., D.C.L., LL.D., F.R.S.
2. Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale. F. S. GRANGER, M.A., A.R.I.B.A.
3. Sanitary Building Construction. KEITH D. YOUNG, F.R.I.B.A.
4. House Drainage and Sanitary Appliances. PROF. W. H. CORFIELD, M.A., M.D., &c., Professor of Hygiene and Public Health, University College, London; Medical Officer of Health for St. George's, Hanover Square.
5. Details of Plumbers' Work. WILLIAM WILKINSON, R.P.C., Chief Sanitary Inspector, Derby.
6. Scavenging and Disposal of Refuse. J. C. THRESH, M.B., D.SC.LOND., F.R.MET.SOC., Medical Officer of Health to the Mid-Essex combined R.S.A. and to the Essex County Council.

7. Sewage Disposal—*(a)* of Large Houses; *(b)* of Small Villages; *(c)* of Small Towns. W. H. RADFORD, ASSOC.M.INST.C.E.
8. Water Supply, Drinking Water, Pollution of Water. GEORGE REID, M.D., D.P.H., Medical Officer of Health to the Staffordshire County Council.
9. Diseases of Animals in relation to Meat Supply: Characteristics of Vegetables, Fish, &c., unfit for food. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
10. Infectious Diseases and Methods of Disinfection. PROF. A. BOSTOCK HILL, M.D., S.SC.C.CAMB., F.I.C., Professor at Queen's College, Birmingham.
11. Nuisances and Offensive Trades. S. BARWISE, M.B.LOND., D.P.H., Medical Officer of Health to the Derbyshire County Council.
12. Powers and Duties of Sanitary Inspectors. S. BARWISE, M.B.LOND., D.P.H.
13. Sanitary Law, General Enactments, Public Health Act, 1875, Model Bye-Laws, &c. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.

WAKEFIELD.

1. Qualifications and Duties of Sanitary Inspectors. F. W. BARRY, M.D., Local Government Board Inspector (Medical Department).
2. Nuisances and Insanitary Conditions. J. SPOTTISWOODE CAMERON, M.D., Medical Officer of Health for Leeds.
3. Ventilation, Warming and Lighting. HARVEY LITTLEJOHN, M.B., Medical Officer of Health for Sheffield.
4. Sanitary Construction of Buildings. J. VICKERS EDWARDS, County Surveyor for the West Riding.
5. House Drainage. J. A. BEAN, Deputy County Surveyor for the West Riding.
6. Sewerage and Sewage Disposal. EDWARD R. S. ESCOTT, M.INST.C.E., Borough Engineer for Halifax.
7. Disposal of Refuse. J. MITCHELL WILSON, M.D., Medical Officer of Health for Doncaster Borough and Doncaster Combined Sanitary Districts.

8. Water Supplies. W. ARNOLD EVANS, M.D., Medical Officer of Health for Bradford.
9. Food Supplies. JOHN W. MASON, M.B., Medical Officer of Health for Hull.
10. Milk. Prof. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
11. Sanitary Law. JAMES R. KAYE, M.B., Medical Officer of Health for Huddersfield.
12. Infectious Diseases and Disinfection. ARTHUR WHITELEGGE, M.D., Medical Officer to the West Riding County Council.

CARDIFF.

1. Introductory.—House Drainage and Sanitary Appliances. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
2. Sanitary Building Construction. KEITH D. YOUNG, F.R.I.B.A.,
3. Water Supply, Drinking Water, Pollution of Water. EDWARD WALFORD M.D., D.P.H.CAMB., Medical Officer of Health for Cardiff.
4. Details of Plumbers' Work. W. H. ALLEN, R.P.C.
5. Drainage, Scavenging, Disposal of Refuse, and Sewage. W. HARPUR, M.INST.C.E., Borough Engineer for Cardiff.
6. Infectious Diseases and Methods of Disinfection. EDWARD WALFORD, M.D., D.P.H.CAMB., Medical Officer of Health for Cardiff.
7. Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for food. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
8. Powers and Duties of Sanitary Inspectors. D. S. DAVIES, M.D. LOND., D.P.H. CAMB., Medical Officer of Health for Bristol.
9. Nuisances and Offensive Trades. PROF. A. BOSTOCK HILL, M.D., S.SC.C.CAMB., F.I.C., Professor at Queen's College, Birmingham.
10. Objects and Methods of Inspection. J. F. J. SYKES, M.B., B.SC., Medical Officer of Health for St. Pancras.

11. Food Adulteration, Sale of Food and Drugs Act. THOMAS HUGHES, F.I.C., F.C.S., Analyst for Borough of Cardiff.
12. Sanitary Law, General Enactments, Public Health Act, 1875, Model Bye-Laws, &c. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
13. Ventilation, Heating, and Lighting. P. RHYS GRIFFITHS, M.B., B.SC.LOND.
14. Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale. E. FOSTER, Chief Engineering Assistant to the Borough Engineer, Cardiff.

NEWCASTLE-UPON-TYNE.

1. Introductory, and on Ventilation, Heating and Lighting. LOUIS PARKES, M.D., D.P.H., Medical Officer of Health for Chelsea, London.
2. House Drainage and Sanitary Appliances. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
3. Sanitary Building Construction. ARTHUR J. GALE, F.R.I.B.A., F.S.I.
4. Details of Plumbers' Work. T. S. BROWN, R.P.C.
5. Scavenging, and Disposal of Refuse. W. HOWARD SMITH, ASSOC.M.INST.C.E., City Engineer, Carlisle.
6. Water Supply, Drinking Water, Pollution of Water. G. REID, M.D., D.P.H., Medical Officer of Health to the Staffordshire County Council.
7. Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for food. FRANCIS VACHER, F.R.C.S., F.C.S.
8. Infectious Diseases and Methods of Disinfection. H. E. ARMSTRONG, D.HY. (Durham), M.R.C.S., L.S.A., Medical Officer of Health for Newcastle-upon-Tyne.
9. Powers and Duties of Sanitary Inspectors; Nuisances and Offensive Trades. THOMAS EUSTACE HILL, M.B., B.SC., Medical Officer of Health for South Shields.
10. Objects and Methods of Inspection. ALFRED E. HARRIS, L.R.C.P., L.R.C.S., F.C.S., Medical Officer of Health for Sunderland.

11. Sanitary Law, General Enactments, Public Health Act (1875), Model Bye-Laws, &c. PROF. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
12. Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale. W. MCCHLERY.

NORWICH.

1. Introductory.—Ventilation, Heating, and Lighting. SIR DOUGLAS GALTON, K.C.B., D.C.L., LL.D., F.R.S.
2. Sanitary Building Construction. PERCIVAL GORDON SMITH, F.R.I.B.A., Architect to the Local Government Board.
3. Water Supply, Drinking Water, Pollution of Water. Major LAMOROCK FLOWER, Sanitary Engineer to the Lee Conservancy Board.
4. House Drainage and Sanitary Appliances. W. C. TYNDALE, ASSOC.M.INST.C.E.
5. Scavenging, Disposal of Refuse, and Sewage. T. DE COURCY MEADE, M.INST.C.E., Engineer to the Local Board, Hornsey.
6. Infectious Diseases and Methods of Disinfection. J. C. THRESH, M.B., D.SC.LOND., F.R.MET.SOC., Medical Officer of Health for Mid-Essex combined R.S.A., and to the Essex County Council.
7. Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for food. Prof. A. WYNTER BLYTH, Barrister-at-Law, M.R.C.S., Medical Officer of Health for St. Marylebone.
8. Powers and Duties of Sanitary Inspectors. J. F. J. SYKES, M.B., B.SC., Medical Officer of Health for St. Pancras.
9. Objects and Methods of Inspection. THOMAS W. CROSSE, F.R.C.S., Medical Officer of Health for Norwich.
10. Sanitary Law, General Enactments, Public Health Act, 1875 Model Bye-Laws, &c. J. F. J. SYKES, M.B., B.SC., Medical Officer of Health for St. Pancras.
11. Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale. HENRY LAW, M.INST.C.E.
12. Nuisances and Offensive Trades. A. NEWSHOLME, M.D., D.P.H., Medical Officer of Health for Brighton.

LIVERPOOL.

1. Introductory, and on Ventilation, Heating and Lighting. LOUIS PARKES, M.D., D.P.H., Medical Officer of Health for Chelsea.
2. House Drainage and Sanitary Appliances. H. PERCY BOULNOIS, M.INST.C.E., City Engineer, Liverpool.
3. Sanitary Building Construction. T. HARNETT HARRISSON, ASSOC.M.INST.C.E., F.R.I.B.A.
4. Details of Plumbers' Work. J. WRIGHT CLARKE.
5. Scavenging, and Disposal of Refuse. JOHN PRICE, ASSOC.M. INST.C.E., Surveyor to the Local Board, Toxteth Park.
6. Water Supply, Drinking Water, Pollution of Water. JOSEPH PARRY, M.INST.C.E., Waterworks Engineer, Liverpool.
7. Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for Food. FRANCIS VACHER, F.R.C.S., F.C.S.
8. Infectious Diseases and Methods of Disinfection. H. E. ARMSTRONG, D.HYG., Durham, M.R.C.S., Medical Officer of Health for Newcastle-upon-Tyne.
9. Powers and Duties of Sanitary Inspectors; Nuisances and Offensive Trades. J. F. J. SYKES, M.B., B.SC., Medical Officer of Health for St. Pancras.
10. Objects and Methods of Inspection. E. W. HOPE, M.D., Assistant Medical Officer of Health for Liverpool.
11. Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale. W. GOLDSTRAW, Surveyor of Buildings, Liverpool.
12. Sanitary Law, General Enactments, Public Health Act, 1875. Model Bye-Laws, &c. PROF. A. WYNTER BLYTH, M.R.C.S., Barrister-at-Law, Medical Officer of Health for St. Marylebone.

WORCESTER.

1. Introductory. SIR DOUGLAS GALTON, K.C.B., D.C.L., LL.D., F.R.S.
2. Ventilation, Heating and Lighting. SIR DOUGLAS GALTON, K.C.B., D.C.L., LL.D., F.R.S.
3. Sanitary Building Construction. KEITH D. YOUNG, F.R.I.B.A.

4. Principles of Calculating Areas, Cubic Space, &c.: Interpretation of Plans and Sections to Scale. HENRY LAW, M.INST.C.E.
5. Water Supply, Drinking Water, Pollution of Water. GEORGE WILSON, M.A., M.D., F.R.S.E., Medical Officer of Health for Mid-Warwick.
6. Sewage Disposal—*(a)* of Large Houses; *(b)* of Small Villages; *(c)* of Small Towns. F. E. WILLCOX, ASSOC.M.INST.C.E.
7. Scavenging, and Disposal of Refuse. T. DE COURCY MEADE, M.INST.C.E., Surveyor to Local Board, Hornsey.
8. House Drainage and Sanitary Appliances. G. REID, M.D., D.P.H., Medical Officer of Health to the Staffordshire County Council.
9. Nuisances, Insanitary Condition, Offensive Trades, and Powers and Duties of Sanitary Inspectors. G. H. FOSBROKE, M.D., D.P.H.CAMB., Medical Officer of Health to the Worcestershire County Council.
10. Infectious Diseases and Methods of Disinfection. PROF. A. BOSTOCK HILL, M.D., S.SC.C.CAMB., F.I.C., Professor at Queen's College, Birmingham.
11. Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for Food. ALFRED HILL, M.D., Medical Officer of Health for Birmingham.
12. Sanitary Law, General Enactments, Public Health Act, 1875, Model Bye-Laws, &c. PROF. A. WYNTER BLYTH, M.R.C.S., Barrister-at-Law, Medical Officer of Health for St. Marylebone.

The Council desire to record their sincere thanks, to the Lecturers both in London and the provinces for the great benefits they have conferred upon the Students, and for the assistance they have given to the diffusion of Sanitary knowledge, by the preparation and delivery of these Lectures, and also to those who took much trouble to make the various visits instructive to the Students.

EXAMINATIONS.

During the year two Examinations for Inspectors and one for Local Surveyors have been held in London, and Examinations for Local Surveyors have also been held at—

Derby.
Cardiff.

And for Inspectors of Nuisances at —

Bristol.	Cardiff.
Newcastle.	Norwich.
Derby.	Liverpool.
Wakefield.	

At these examinations 35 Candidates presented themselves for Examination as Local Surveyors, and 513 as Inspectors of Nuisances; 20 received Certificates of Competency, as regards their Sanitary knowledge, to discharge the duties of Local Surveyors, and 315 those of Inspectors of Nuisances.

Since these Examinations were first established 76 have been held, 30 for Local Surveyors, and 46 for Inspectors of Nuisances, and 2,041 Candidates have been examined, of whom 98 have passed the Examination for Local Surveyors, and 1,140 that of Inspectors of Nuisances.

The desirability of a Certificate of Competency for Sanitary Inspectors is definitely recognized by at least twenty-seven Sanitary authorities in the metropolis, eighty-three authorities in the provinces, and probably by many others of which the Council are not aware.

The Local Government Board have approved of The Sanitary Institute as a body, whose Certificate that a person has by Examination shown himself competent for the office of Sanitary Inspector under the Public Health (London) Act, 1891, shall be sufficient for the purposes of the requirements of Section 108 (*d*) of that Act.

Two Examinations were held during the year, in conjunction with the Carpenters' Company, in Practical Sanitation and in Building, so far as it relates to Sanitary Construction; forty-two Candidates were examined and thirty-seven were certificated. These two Examinations were preceded by courses of Preparatory Lectures, given at the Carpenters' Hall.

CONGRESS AND EXHIBITION.

The Annual Congress was held at Portsmouth (by the invitation of the Town Council) under the Presidency of Sir Charles A. Cameron, M.D., D.P.H.CAMB., M.R.C.P., F.I.C.

Accommodation was provided for the Meetings, in the Town Hall and other buildings. About 200 Members and Associates of the Institute were present, also 150 holders of Congress Tickets and invited guests. Vol. XIII. of the Transactions will contain a full account of the papers read in the various meetings.

In addition to the regular Sections of Congress which deal with Sanitary Science and Preventive Medicine; Engineering and Architecture; Chemistry, Meteorology and Geology; the following Conferences were arranged, for the purpose of giving those interested in the various branches of Sanitary work an opportunity of discussing Sanitary matters of especial interest to them:—

Medical Officers of Health.
Municipal and County Engineers.
Naval & Military Hygienists.
Ladies on Domestic Hygiene.
Inspectors of Nuisances.

The Exhibition of Sanitary Apparatus and Appliances and Articles of Domestic Use and Economy was held in the new Drill Hall, and was open for twenty-four days. It was attended by 49,000 Visitors. The Judges awarded seventeen Medals and sixty-seven Certificates of Merit. With regard to certain Exhibits, such as Gas Stoves and Fires, Cowls, Water Meters, Pipe-joints, Foods, and other articles requiring special Tests, it is impossible for the Judges to come to a satisfactory decision as to their merits without practical trial, involving special arrangements and investigations in London and elsewhere after the Exhibition; thirty-eight Exhibits of this kind were selected for further practical trial. Demonstrations of Cookery and Dairy-work were given daily at the Exhibition, including the use of Electric Cooking Appliances. A Bacteriological Section was also arranged in a room specially set apart for the purpose, and contained a large collection of apparatus for Cultivating, Examining, Mounting, and Photographing Bacteria. The several processes were shown in all stages of progression, and many specially interesting specimens were lent by well-known authorities.

During the year the Institute has published an Illustrated List of Exhibits to which Medals and Certificates have been awarded, at the Exhibitions held in connection with the Annual Congress. It has been published in the belief that it will be a useful guide to

professional men and to the public in the selection of appliances and articles included in the extensive scope of these Sanitary and Domestic Exhibitions.

PARLIAMENTARY WORK.

Very few Sanitary measures were brought before Parliament during the year, but the Council prepared a number of suggestions on the Sanitary provisions of the Building Law Consolidation Bill, drafted by Mr. Ritchie; owing, however, to the course of public business, this Bill was not introduced to the House. The Council were also invited by the Committee of the House of Commons to give evidence on the Plumbers' Registration Bill, and Sir Douglas Galton, as Chairman of the Council, attended and gave evidence, making various suggestions, several of which were adopted by the Committee.

THE PARKES MUSEUM.

A number of new exhibits have been added to the Museum during the year, and its use by the public and teachers of Hygiene has largely increased.

Classes of Students have been brought to the Museum by the Examiners or Lecturers of several Institutions, including: —

The Architectural Association.
The City and Guilds Central Institute.
The College of State Medicine.
King's College.
The London Hospital.
University College, London.
The Maria Grey Training College.
The (Queen's) Nurses Institute.
The Polytechnic Institute.
The Post Graduate Course.
The Royal College of Surgeons.
The Royal College of Physicians.
The University of London.

Eleven Classes have been brought by private teachers, making 68 classes with a total of 854 students.

The use of the Museum has been granted free of charge to all these Institutions and Classes, and it is also open free to the Public, although the support of the Museum involves an expenditure, out of the funds of the Institute, of about £600 per annum.

The visitors to the Museum during the year numbered altogether 16,575.

CHARTER.

The Council have submitted an application to The Privy Council for a grant of a Royal Charter to the Institute, which is still under consideration.

LIBRARY.

The use of the Library is steadily increasing: during the year there have been 846 readers, as against 546 last year. 310 volumes and pamphlets have been presented to the Library during the year. A list of these will be published in Volume XIII. of the Transactions.

EPITOME OF REGISTERS OF MEMBERS AND ASSOCIATES.

The following table gives the precise changes which have taken place in the various classes of which the Institute is composed during the past year. It will be seen that the number of Honorary Fellows is practically unchanged, and deaths have reduced the Fellows by eight. On the other hand, the number of Members is increased by 60, and that of Associates by 151, so that the aggregate increase is 202.

	Hon. Fellows.	Fellows.	Members.	Associates.	Total.
Dec. 31, 1891	27	154	450	447	1078
Elected	+1	+3	+82	+180	+266
Transferred	..	..	–3	–6	–9
Resigned	..	..	–13	–2	–15
Erased	..	–1	–2	–20	–23
Died	–2	–10	–4	–1	–17
Dec. 31, 1892	26	146	510	598	1280

It is with much regret that the Council have to report the death of:—Prof. Alfonso Corradi and Dr. Hy. J. Bowditch, Hon. Fellows; Prof. Sir Wm. Aitken, M.D., F.R.S., Alfred Carpenter, M.D., M.R.C.S. Sir T. W. Evans, M. Berkeley Hill, M.B., F.R.C.S., John Chas Steele, M.D., John Thompson, M.D., F.R.C.S., J.P., John W. Taylor, M.D., D.SC., J.P., Col. T. Picton Turbeville, W. H. Michael, Q.C., H. J. Marten, M.INST.C.E., Fellows; Right Hon. Earl Bathurst, George Douglas, Thomas Lloyd, John W. Tripe, M.D., M.R.C.S., M.O.H., Members; H. A. Palmer, Associate.

FINANCE.

The Statement of Income and Expenditure for the year shows a considerable increase in the annual revenue, and the growing work

of the Institute has also necessitated a considerable increase in the expenditure. In September the Trustees of the Berridge Estate handed over to the Institute an amount of £9,248 11s. 1d., in Consols, as part of the legacy left by Mr. Richard Berridge, of Ballynahinch Castle, Ireland, for the advancement and propagation of Education in the Economic and Sanitary Sciences. This, of course, greatly increases the financial strength of the Institute and its power for usefulness in the spread of Sanitary Knowledge, and is gratefully acknowledged by the Council.

EPITOME OF THE WORK OF THE INSTITUTE, 1892.

London Lectures and Examinations.

		Total Attendance.
2	Sessional Meetings for the discussion of Sanitary subjects	156
5	Lectures to Ladies on Domestic Hygiene	293
1	Address on Domestic Hygiene	100
34	Lectures to Sanitary Officers	3,263
1	Examination Local Surveyors	23
2	Examinations Sanitary Inspectors	227
45		4,062

Provincial Lectures and Examination.

87	Lectures to Sanitary Officers	7,269
2	Examinations Local Surveyors	12
7	Examinations Sanitary Inspectors	286
96		7,567

Provincial Congress and Exhibition.

5	Sectional Meetings	218
5	Conferences	340
3	Lectures	1,380
	Exhibition open for 4 weeks, at which a number of Lectures were given	49,000
		50,938

Thomas Crawford,
Chairman of Council.

E. White Wallis, *Secretary.*
22nd February, 1893.

STATEMENT of INCOME and EXPENDITURE for the Year ended 31st December, 1892.

Dr.

Expenditure.	£	s.	d.	£	s.	d.
To Transactions, Cost of Printing, &c., less Sales and Advertisements—estimated				171	17	2
" Sessional Meetings	7	5	6			
" Lectures, Sanitary Officers	317	15	6			
" Domestic Hygiene	51	18	0			
" Examinations of the Institute	1,280	15	11			
" in connection with the Carpenters' Company	144	7	5			
" Illustrated List of Awards at Exhibitions	110	1	4			
" Congress—General Expenses	232	9	0			
				2,144	12	8
" Rent, Rates, Taxes, and Insurance	266	19	6			
" Salaries and Wages	685	5	0			
" Coals and Care of Offices	37	16	10			
" Repairs and Alterations	28	17	1			
" Library, Binding, &c.	8	6	0			
" Postage and Carriage	75	13	9			
" Printing and Stationery	97	2	3			
" Advertising	9	16	6			
" Incidental Expenses	81	7	7			
" Law Charges	23	3	8			
" Office Furniture	7	3	5			
" Depreciation of Leasehold	50	0	0			
				1,371	11	7
				3,688	1	5
" Balance for the year 1892				324	15	4
				£4,012	16	9
" Balance to be carried forward				£11,434	15	10

Income.	£	s.	d.	£	s.	d.
By Annual Subscriptions	830	0	6			
" Entrance Fees	100	16	0			
" Life Compositions	21	0	0			
" Fellowship Fees	10	10	0			
" Donations	4	4	0			
				966	10	6
" Illustrated List of Awards at Exhibitions	82	1	3			
" Lectures, Sanitary Officers	574	12	9			
" Domestic Hygiene	24	4	3			
" Examinations of the Institute	1,777	7	8			
" in connection with the Carpenters' Company	162	15	0			
" Publications — Farr's and Simon's — Profit on Sales	6	11	10			
" Interest on Deposit	6	6	4			
" Congress—Sale of Tickets, &c.	36	4	0			
" Balance from Exhibition account	376	3	2			
				3,046	6	3
" Balance brought forward from last account				2,110	0	6
" Legacy from Berridge Estate— (£9,248 11s. 1d. Consolidated Stock) valued at				9,000	0	0
" Balance carried forward on Year 1892				324	15	4
				£11,434	15	10

Alfred Lass, Wood & Co., Chartered Accountants,
Magnus Ohren, Assoc.M.Inst.C.E., } *Auditors.*

Examined and approved,

February 25th, 1893.

STATEMENT OF INCOME AND EXPENDITURE connected with Exhibition at Portsmouth, 1892.

Dr.

Expenditure.	£	s.	d.
To Printing and Advertising	307	18	5
„ Catalogues and Programmes	123	1	8
„ Bands and Entertainments	237	12	0
„ Lectures	39	9	11
„ Curator's Salary and Expenses	186	13	3
„ Wages	187	14	11
„ Incidental Expenses	94	13	7
„ Buildings, Fittings and Decorations	151	17	6
„ Judging Expenses (Partly Estimated)	210	14	8
„ Grounds	194	2	1
	1,733	18	0
„ Balance	376	3	2
	£2,110	1	2

Cr.

Income.	£	s.	d.
By Rent for Space	973	19	6
„ Admissions	847	9	3
„ Catalogues and Programmes	221	2	9
„ Fees for further Trials	19	9	8
„ Grounds	48	0	0
	£2,110	1	2

Examined and approved,
ALFRED LASS, WOOD & Co., Chartered Accountants.
MAGNUS OHREN, Assoc.M.Inst.C.E., } *Auditors.*

February 25th, 1893.

GENERAL BALANCE SHEET, 31st DECEMBER, 1892.

Liabilities.	£	s.	d.
To Subscriptions paid in advance for 1893	48	6	0
„ Examination Fees „ „	27	16	6
„ Exhibition Account	41	13	0
„ Museum Arrangement Account	11	2	5
„ Sundry Creditors	633	9	3
	762	7	2
„ Balance of Assets over Liabilities	11,434	15	10
	£12,197	3	0

Assets.	£	s.	d.	£	s.	d.
By Lease of Premises, 8 years unexpired	394	3	8			
„ Library and Contents of Museum, estimated value	500	0	0			
„ Furniture and Fixtures, estimated value	100	0	0			
„ Transactions and Publications, estimated value	545	2	6			
„ Farr's Works, estimated value	29	12	6			
„ Simon's „ „	100	10	0			
				1,669	8	8
„ Sundry Debtors—						
Members' Subscriptions and Arrears	149	2	0			
„ „ from old Societies	12	12	0			
Fellowship Fees	5	5	0			
Entrance Fees	50	8	0			
Expenses *re* Charter in suspense	63	14	3			
Amount due on account of Congress and Provincial Lectures	124	8	6			
Exhibition Account	11	10	0			
				416	19	9
„ Cash at Bankers on Current Account	632	1	8			
„ „ „ on Deposit	500	0	0			
	1,132	1	8			
less Petty Cash overdrawn	21	7	1			
	1,110	14	7			
„ Investment (£9,248 11s. 1d. Consolidated Stock) valued at	9,000	0	0			
				10,110	14	7
				£12,197	3	0

Examined and approved, ALFRED LASS, WOOD & Co., Chartered Accountants,
MAGNUS OHREN, Assoc.M.Inst.C.E., } *Auditors.*

February 25th, 1893.

DISPOSAL OF HOUSE & TOWN REFUSE.

By Charles Jones, M.Inst.C.E., F.S.I.

Read at Sessional Meeting, February 10th, 1892.

It has been my privilege on previous occasions to read before this Institute various papers dealing with the above, and as probably many of you either heard me on those occasions or read the printed papers, it will be unnecessary to make any lengthy introductory remarks upon the importance of this subject, and the difficulties which Vestries and other public bodies have found in dealing, in a satisfactory manner, with the large quantity of material which comes under the heading of "House and Town Refuse."

Town refuse, as referred to in this paper, includes not only the contents of ashpits and dustbins, but also the large quantities of refuse from businesses and trades, and sweepings of the streets—products which formerly could be dealt with in various ways; but now the large increase in building operations and the population, entirely prohibit public bodies from dealing with the question in the old methods, which will not be introduced into my paper to-night.

Material which at one time could be disposed of at a small cost, and in some instances at a profit, for the purposes of agriculture, and in the manufacture of bricks, cannot now be so dealt with. Hence, day by day we see that the question is becoming of more importance, and a source of greater difficulty.

What we have to consider is how to deal with the difficulty under *existing* circumstances, the great principle being to dispose of the material as *rapidly* as circumstances will permit, and *in the most sanitary and economical manner*.

Various methods of separation and mixing, in order to make the material saleable, have been tried, but practice shows the cost rarely falls below the realisable value, and generally far exceeds

it; leading us to the conclusion that the most truly economical method is to get rid of it as it is received, and *with as little handling as possible*. It was only natural, therefore, to fall back upon that which has been, and we presume will ever be, the great natural agent of purification, viz., "fire."

Generally speaking, dustbins contain a large proportion of combustible material in the form of cinders and unburnt coal (varying, of course, according to the locality from which the refuse is taken), and we are thus provided with the necessary fuel for raising the heat to destroy the material of a less combustible nature comprised in towns' refuse. It is many years since attempts were first made to deal with the refuse in this way. Furnaces were constructed, but in a very crude manner, failing to answer the purpose for which they were intended, but leading many inventors to devote considerable attention to the subject, and to deal with it in a scientific way by constructing furnaces to utilize to the best advantage the combustible portion contained in the refuse. I will not stop to describe the various types of furnaces, but will merely state that, generally speaking, they were bad; the shape and construction of the fire-brick arches were wrong, the arrangements for feeding were unsatisfactory, and the flues and passages for gases were designed more by guess-work than by calculation. It is therefore no wonder that these proved only feeble attempts to introduce the principle of fire, it being found necessary to burn coal and other fuel in order to dispose of the refuse collected.

In the year 1876 experiments were made by Mr. Fryer, of the firm of Manlove, Alliot, and Fryer, who constructed a furnace which he named the "Destructor." He was fortunate in inducing the Nottingham Corporation to give it a trial, and it is needless to say that it turned out sufficiently successful to warrant them extending the experiments, and in a very short time three of these Destructors were built and at work upon Fryer's principle.

I will explain, for the benefit of those present who may not be familiar with the construction of the apparatus, that the cells are constructed with an internal arrangement of the flues, feeding hoppers, furnace doors, and firebars. The disposition of the cells, either side by side or back to back, is simply a matter dependent upon the site and the convenience of the situation. Each cell constitutes a separate furnace, consisting of a cavity enclosed by a reverberatory arch lined with firebricks. It is supplied with a hearth for the reception of the material to be consumed, from which it passes into the furnace proper. The firebars are placed in a slanting position, in order to favour the

passage of the material to the front, and so facilitate the removal of the clinkers. The top of the Destructor forms a perfect platform, having an opening over each cell into which the refuse to be burnt is shot from the collecting carts. The opening for the entry of refuse is divided from the opening for the exit of gases by a wall, and a bridge is built to prevent refuse which is heaped on at each charge from getting into the flue immediately below. Cells are provided with special openings for the introduction of infectious mattresses, diseased meat, dead cats and dogs, which fall direct upon the red burning mass, and are there consumed without nuisance.

Many other inventions of minor importance have been brought out, but they are not sufficiently to the fore for me to trouble you with the various details connected with them. It will be sufficient for our purpose to give a description of one of the latest which has attracted considerable attention, viz., the Destructor which has been named the "Perfectus," of which Mr. Warner, of the firm of Goddard, Massey and Warner, is the patentee.

This has been adopted in several towns. It may be described as consisting, generally speaking, of a block of brickwork 34 ft. wide by 30 ft. long, by 10 ft. 6 in. high, strengthened on the front of each furnace with heavy segmental cast iron facia plates to protect the brickwork, having sliding rails to support the furnace doors, with baffle plates of special construction, so that the fires may be examined quickly without allowing the admission of cold air. The ashpits are the same width as the furnace arches, and their front parts are also covered with ironwork, having sliding doors, so that they may be closed if necessary and the air regulated or the fires be blown up by means of a large blower, which forms part of the plant erected over the top of each furnace. There are two dampers worked from long wrought iron spindles, and balanced on the outside of the furnaces. These dampers are closed each time the men "clinker," and each time they draw down fresh refuse to be burnt, so that the furnaces are kept very hot. Internally the block of brickwork contains six reverberatory fire brick arches 5 ft. by about 10 ft. One half of the arch is made to cover a special drying hearth, upon which the refuse is prepared for actual combustion. The other half of the arch covers the fire grate, which is made wholly of wrought iron, supported upon strong bearers. The structure is tied together by wrought iron tie-rods at the back and front, supported by channel irons, and at the ends by massive cast iron back stays. Over each damper a vertical flue is constructed, terminating in the main flue leading to the cremator, and is covered by a cast iron frame and cover to allow a passage

for workmen for cleaning. The top of the furnace forms a level platform, upon which the refuse is tipped from the carts as delivered, and is paved with blue Staffordshire bricks on cement. Each furnace has an opening or hopper capable of holding about the third of a cartload of refuse, and the contents of this hopper are discharged by means of a wrought iron lever projecting through the furnace roof; there are two doors at the end of the main flue for taking out fine dust, and there are special pockets at various distances, provided with frames and covers for cleaning purposes while the Destructor is in operation.

The refuse when removed from the house is now almost invariably conveyed to the depôt in covered carts or waggons, so as to avoid the nuisance of the fine dust, paper, &c., being blown about the streets by the wind, to hide the material from sight, and to prevent the dissemination of offensive smells and the diffusion of disease germs. On arriving at the depôt, the vans are drawn up an inclined roadway to the tops of the Destructors, where they are tipped against a beam. It is necessary that the larger tins and old iron utensils should be picked out before it is fed into the furnaces, and in some instances it may be advisable to pick out the bottles, which can be readily sold. The material is then fed into the feed-holes—before referred to—on to the sloping hearth, drawn forward by the stokers on the ground level with long iron rakes; and having been properly raked down and evenly spread over the fire-bars, the furnace door is closed and the contents of the cell are allowed to burn for a period varying from one and half to two hours, it not being advisable to draw the fires more frequently than this, as the destruction of the material would not be perfect. At the expiration of the time mentioned, the furnace door is opened and the fires drawn, the contents of the cell having been reduced to a hard clinker, which comes out in large cakes. During the burning a certain proportion of fine ashes falls through the fire-bars, and would be likely to cause inconvenience and danger to the stoker by being blown about. In order to avoid this I have designed a pit, of concave form, under the fire-bars, to hold water, into which the dust will fall, and can be removed in a damp state when the fires are drawn. It being most essential that the high temperature in the dust-chamber should be maintained, it is very desirable that the fires should be kept going both night and day, and an arrangement made, so that during the feeding and clinkering, when the mouth of the furnace is open, the admission of cold air into the dust-chamber tending to lower the temperature, should be reduced as much as possible. This is done by means of a cast-iron hinged door over the opening entering the dust-

chamber, attached by a chain to the *furnace door*, and is so arranged that whenever the furnace door is open the entrance to the dust-chamber is about four-fifths of its area closed, and when the furnace door is shut the flue door is open. This arrangement is entirely automatic, and quite independent of the attention of the stokers. The residuum from the fires—a hard clinker and fine ashes—amounts to about 25 per cent. of the quantity fed into the furnaces, and may be utilised in many ways. It is an excellent material for foundations of roads; when broken, for concrete, tar-paving, &c.; or when ground in a mill, is unequalled for mortar for building purposes. Thus the house refuse has not only been transformed from a filthy and deleterious mixture into a material at once inoffensive and useful, but during the process a most valuable property has been developed, viz., immense steam-producing power, the utilisation of which will considerably reduce the cost of disposal.

The establishment of these Destructors has met with so much opposition in many towns as to be almost incredible, and no doubt in their primary condition there were defects, but even then they were as nothing compared to the injury to health, so successfully obviated by the rapid destruction of tons upon tons of objectionable matter, which had to be got rid of in some way. Formerly the vapours and gases given off in the drying of the material, and the first stage of burning, before it got well into the fire, were perceptible, as were also the fine dust, unburnt paper, &c., which escaped from the shaft. But these are now things of the past, and the fact that Destructors are in full and successful operation in the very heart of London, numerous large towns, and in our fashionable residential suburbs, goes to prove beyond a doubt that a Destructor, if properly worked, may be used anywhere and everywhere without the slightest fear of any complaint, other than a sentimental one, arising in connection with it. I may mention that a Destructor has been in working order for some eight years in Ealing, adjacent to high class residential property; that is to say, within 380 yards are houses of a rateable value ranging from £120 to £330; within 183 yards are two Isolation Hospitals, erected not only under the approval of the Medical Officers of Health to the Local Authorities, but with the approval of the Medical Advisers to the Local Government Board; and within a distance of 600 yards, there are a Convent and a large Military College, not to speak of the 100 to 150 houses of smaller rateable value, which have sprung up all around it; and Dr. Thomas Stevenson, one of the Royal Commission of which Lord Bramwell was the head, and Lecturer on Chemistry at Guy's Hospital, states: "That if a Fryer's Destructor, with Fume Cremator, was erected, it would not be possible to affect the health of the surrounding population, and so cause the slightest nuisance of any kind or description."

How to avoid the nuisance from the vapours, gases, fine dust, charred paper, &c., to which I have referred, engaged attention for some time, and various experiments to meet these difficulties, ultimately resulted in the simple construction known as the "Fume Cremator." This simple apparatus is built in such a position between the furnaces and the chimney shaft that all the products of combustion are bound to pass through it before reaching the shaft. It consists of a reverberatory arch, with rings of fire-bricks placed in the direction of the gases. Ribs of fire-brick projecting from the arch serve to deflect the gases, and to direct them on to the top of the red-hot mass of fire. The heat in the Cremator, which varies from 1,000 to 1,500 degrees F. is maintained by fine coke breeze, or ashes screened from the refuse, fed in at the top, and an arrangement made by which fresh air is supplied beneath the fire-bars, to assist combustion and dilute the vapours as they pass into the Cremator. As a proof of the efficacy of this contrivance, I may mention that at Ealing not only is the house refuse treated in the Destructor, but far more offensive material, viz., sewage sludge, is disposed of without the slightest nuisance being caused.

A material which is also a source of considerable difficulty to dispose of, especially in our large towns, is the slop or slurry, which is taken up from the roads. This slop, which contains a large amount of organic matter, when mixed with the house refuse, can be effectually dealt with in the Destructor; the ingredients which it contains making the clinker a more valuable material for building purposes, owing to there being a large proportion of Silica with it.

From returns made we find that some fifty towns have adopted the Destructor, of which twenty-four have in conjunction with the Destructor adopted the "Fume Cremator," and almost without exception the reports as to its use are most satisfactory; and, quoting from a report to the Highways and Sewage Committee of the Corporation of Hyde, embodied in the annual report of one of our best known suburban districts, it is stated with reference to the Destructor erected in the latter district:—"Adjoining the furnaces, and in a line with the chimney, a Cremator is constructed, consisting of a furnace which completely consumes the gases, and prevents any large quantity of smoke issuing from the chimney." It may be mentioned that at Ealing for the year 1891 the average weekly cost of coke breeze was £1 16s. for seven cells, and did we not require the cinders contained in the house refuse for burning the

sewage sludge, we should adopt the system carried out at Hampstead, Leicester, Langston, &c., using screened cinders for feeding the Cremator. At Hampstead, where there are eight cells, the cost of "Fume Cremator" is 25*s.* per week.

Upon this part of the subject, I will conclude with an extract from a report of F. M. Rimmington, Esq., F.C.S., to the Corporation of Bradford.

BOROUGH OF BRADFORD.

Extract from the Report of F. M. Rimmington, Esq., F.C.S., October, 1889.

To the Chairman of the Sanitary Committee.

In accordance with your instructions I have made four visits to the Destructors in Hammerton Street, two visits before the Fume Cremators were in operation and two since. Friday, October 11th, 1889.—The Cremators having now been in use more than a fortnight, and therefore considered in perfect working condition, I again visited the works and made similar tests to those made on similar visits, the result in every instance indicating a decided improvement in every particular. The smell of the escaping vapours is of the first importance as far as the public is concerned, and this objection is now almost annihilated; only an almost imperceptible taint is present. Several experiments were continued for more than half an hour, passing through solutions intended to arrest any compound of sulphur, ammonia, or organic matter, with almost negative results; even the watery vapour from the steam jets appears to be decomposed, for only 5½ grains of water were obtained from one cubic foot (6¼ gallons) of the vapour. This almost goes to prove that every compound is decomposed and reduced to its ultimate elements. Wednesday, October 16th, 1889.—The experiments on this occasion were the same as on the 11th inst., only carried on for a longer time. The smell of the vapour was exceedingly slight and difficult to describe: the amount of organic vapour even less than before, almost *nil* in fact. Ammonia, or any salts of ammonia, were quite absent, and 0·19 grains of sulphuric acid in one cubic foot. A kitchen fire would yield much more than this. The effect of the gases from the furnaces passing through the Cremators appears to be that all compounds are decomposed, and scarcely a vestige of any that can be construed to be offensive or obnoxious escapes, and in my opinion the result is as nearly perfect as it can be.

(Signed) F. M. RIMMINGTON, F.C.S.,
Borough Analyst.

I will now refer to the steam-creating power generated in the furnaces, and which may be used in many ways, according to the position and requirements of the district.

At Southampton the heat is utilised in connection with pumping-machinery, the working of ejectors, the driving of a

dynamo, the generating of electricity, and for working the machinery in use at the Sanitary Works, &c. At Hastings it is used for pumping sea water, and in the Ealing district, which I represent, it is used for working the machinery for pumping, for working the clinker-breaking machine, and grinding mill. Now that the adoption of the electric light for illumination by public bodies is coming so much to the fore, the steam power could be most advantageously utilised, and the process which has been described in this paper would enable us to not only dispose of slurry, house refuse, and other material, which is frequently a source of nuisance and heavy expense, but the cost would be reduced to a minimum as compared with other systems of disposal.

The average quantity of refuse destroyed per cell in twenty-four hours may be taken at six tons, and the number of men working six cells, two by day and two by night. In the Ealing district, where the material dealt with is a mixture of sewage sludge and house refuse, containing a large proportion of moisture, there are three men by day and two by night to work seven cells and Cremator; the quantity of material destroyed per cell in twenty-four hours is five tons, and the *gross* cost, including repayment of capital, labour, and Cremating Fumes, is 1*s.* 2¼*d.* per ton, which is, after deducting prime cost, repayment, the value of steam-power, clinker, &c., reduced to 3½*d.* per ton.

To those who carefully study the subject there cannot be two opinions as to the value of this now well-established apparatus. The question of site we cannot but feel is absolutely disposed of, and the sentimental feeling which has so long stood in the way of its more general adoption is dying out. The testimony borne by such men as Drs. Stevenson and Tidy and Professor Wanklyn, together with other well-known scientists, and the men who have the practical working of the same, is sufficient, we think, to settle not only the question of its value, but its absolute freedom from inconvenience and annoyance to surrounding property; and, taken with the proved economical working and results, we feel that every town in England will claim the right to erect and use a Destructor as the best means of disposing of in a sanitary, effectual, and economical manner, a material which has, and is, causing so much difficulty and annoyance.

[*For discussion on this paper see page* 56].

HOUSE DUST REFUSE.

By Mr. Joseph Russell.

Sessional Meeting, February 10th, 1892.

The refuse of towns may be divided under three heads—

House Refuse.
Trade Refuse.
Street Refuse.

In some places these have been and still are dealt with under one and the same system. In other places they are dealt with separately, as should be the case.

It is to a new mode of dealing with the first of these I wish to call your attention, but if the same principles were applied to the two others mentioned, satisfactory results would be obtained.

House dust refuse in the past, when shot on waste land or vacant spaces, was formerly picked over by the poorest class of the population, and the products used or sold, but when a value in the products came to be recognised, the contracting dustman employed persons to sift and sort by hand; and to the present day, in some of the dustyards, women may be seen buried to their waists in the dust that falls through the hand sieve from which they shake and pick over the dust.

As an improvement upon this most insanitary process, the Destructor, so called, has been introduced, and were all the products of the dust-bin combustible they could have been disposed of by this method, but even some of the material which is combustible, leaves an ash of such a character, that it is almost impervious to heat and air, and so hinders the combustion of material above and around it. Many products are incombustible, whilst others, such as animal and vegetable matter, cannot be destroyed by fire without giving forth vapours full of odour of an unpleasant nature, and as much of this material is already commencing to decompose, and in some cases is in an advanced state of decomposition, the vapours and gases cannot be of the most healthful character. The material that is combustible

during the process of burning, alters to a certain extent the character of the incombustible material, but so slightly, as to render this product of little value, and the residue of the heat is wasted, or where used for generating steam the result obtained is very trifling in comparison with the quantity of combustible material used.

Utilization to the fullest extent is the correct principle to apply.

Starting on this principle of utilization, it is advisable first of all to look carefully at what has to be dealt with, and although the dust-bin contains almost everything under the sun in a heterogeneous state, yet there are different kinds or classes of material that predominate, under one of which, any and every article may be placed and dealt with. After five years' experience dividing and weighing a large quantity of material, at various seasons of the year, the following are the principal constituents and average proportions in 1,000 tons.

Average Weight per Load .... 19 cwts. 0 qrs. 20 lbs. nett.

Component Parts.	Average per Load.			Average per 1000 Loads.			
	Cwts.	Qrs.	Lbs.	Tons.	Cwts.	Qrs.	Lbs.
Crockery	"	"	11¾	5	5	0	0
Iron	"	"	4½	2	0	0	20
Tins	"	"	17	7	11	2	22
Mixed Broken Glass	"	"	10¼	4	11	2	2
Bottles	No. 5.			5,000			
Straw and Fibrous Material	"	2	13¼	30	18	1	6
Waste Paper	"	3	8	41	1	1	20
Rags	"	"	8½	3	15	3	16
Coal and Coke	"	"	18	8	0	2	14
Breeze (Cinders) and Ashes	12	0	25	611	3	0	4
Fine Dust	3	2	27	187	1	0	8
Vegetable, Animal and Mineral (ground for manure)	"	3	15	44	3	3	20
Bones	"	"	10⅓	4	12	1	1

These figures are corroborated very nearly by Thomas Codrington, Esq., Engineering Inspector to the Local Government Board, in his report upon the destruction of Town Refuse. There are, therefore, about thirteen classes of material for the dust to be divided into, and to accomplish this, as it must necessarily be on a large scale and on sanitary principles, a scheme has been elaborated, after several years' patient working, by which nine-tenths of the material is sorted without touching by hand, and the remaining one-tenth only after it has been well dusted and cleansed. This is accomplished (and can be seen at the works of the Refuse Disposal Company, Salopian Wharf, Lots Road, Chelsea) by a series of cylindrical screens

with meshes 12 ins. by 3 down to $\frac{1}{8}$ in. square, gravitating-shoots, air-blast, travelling sorting-tables, &c., of which the following is a general description:—

The dust-cart tips the contents into a large revolving cylinder 10 ft. diameter and 12 ft. in length. This screen is fitted with hard wood bars so as to prevent bottles being broken, the spaces between being 12 in. in length and 3 in. wide so as to retain large bottles, &c. The material which is retained in the cylinder is guided by a coarse wood worm so as to ensure that the material shall be retained in the screen a sufficient time to remove all dust and small objects. Large paper, rags, carpets, wood, mill and straw board, boxes, bottles, tins, boots, straw, and other large articles are sorted as delivered, either at the end of the screen or on a travelling table, each article being put into its own class or bin. The material which passes through the mesh of the screen is elevated into a second screen fitted with a spiral worm, so that all the material has to pass over a surface of about 270 ft. in length on a mesh $1\frac{3}{8}$ in. square, and falling from the cylinder is met by a blast of wind which drives all paper into a special cage or cupboard. The material which falls through the blast is directed on to a continuously revolving iron table and is distributed in a thin layer of material, so that each article can be at once picked up and put into its own place. All vegetable and animal matter are left upon the table and are deposited upon the ground by the grinding mill. The principal products sorted from the table are bones, large coal and coke, metals, glass and crockery.

The material which falls through the $1\frac{3}{8}$ in. mesh of this No. 2 screen, is delivered into a third screen, which is fitted with two different sized wires, viz., $\frac{1}{2}$ in. square mesh, and $\frac{3}{8}$ in. square mesh; also an outer or fourth screen with $\frac{1}{8}$ in. mesh. The material that comes from the end of these screens, and also that through the $\frac{1}{2}$ in. mesh forms what the brickmakers call breeze, and is used for burning bricks. That which passes through the $\frac{3}{8}$ in. mesh is called ashes and is mixed with the clay that is formed into the brick. This material also forms the fuel for the boilers, to provide steam for the works; and although at first great difficulty was experienced to maintain steam, yet since the introduction of a patent steel fire bar, with a forced draught, this trouble has been entirely overcome and there is not the slightest difficulty in maintaining the steam pressure required. It has also been found that on account of the very small surface of bar in contact with the fuel, and the very large volume of air in numerous and fine streams and that also heated, the combustion is practically perfect. Another great advantage is also obtained, the clinker

(of which there is about 30 per cent.) does not adhere to the fire-bars, and can be removed with the greatest ease. The products of combustion can be finally passed through scrubbers before discharging them into the air.

A load, or ton, from the time it is shot from the cart will pass through and be sorted into its various places in from five to seven minutes.

One very important feature and to which I would call your attention is the means by which it is made a perfectly healthy and sanitary occupation. The first screen into which the dust cart delivers its contents is provided with a very powerful exhaust fan, which extracts 7,000 cubic feet of air per minute, drawing in any odour and all particles of dust that rise in the screen, and discharges these into closed ashpits under the boiler fires, so providing the forced draught, and at the same time burning the dust and vapours. At various points inlets from other screens and dust chambers are taken into the main tube, so that "it prevents injury to the dust sorters, and the atmosphere in which the operations take place is kept pure."

Having given a general description of the process, it will be well to point out the uses to which the 13 classes of material can be put—

Paper and rags are made into a common brown paper or leather board.

Straw and fibrous material and small pieces of paper for straw boards.

Woollen rags are sold for shoddy.

Large coal and coke, sold.

Iron, sold.

Bottles are sold for re-use, &c.

Crockery has been sold for re-manufacture. Offers have also been made for it, if broken up and sorted into sizes, for use in tar paving instead of marble chips.

Ashes and breeze into block fuel for steam purposes, or for electric lighting, or for brickmakers.

The vegetable and animal substance with the fine dust and the bones for agricultural purposes, or as a basis for distributing strongly concentrated manure (such as nitrate of soda).

Mineral, such as the clinkers, stones, &c., for concrete blocks or artificial paving stones.

The clinkers being very hard are also suitable for mortar, or to use in lieu of sand on wood and other roads.

Broken glass can be remade into bottles, &c., or used for making glass-paper, or as a flux.

Tins, these by a simple process can be cleansed from the fats adhering to them, and the solder run off and collected, whilst the plates are melted and run into sash weights or slabs; or the plates can be bundled up and sent to the mills to be re-forged.

There is, therefore, not only a use for every portion of the house dust, but when so divided and dealt with, these products possess a commercial value, and will pay all the expenses of manufacture and leave a handsome profit on the outlay.

Looking at all other modes of disposal, whether shoots, barging away, carrying to sea, or the Destructor, not one can compare, as all of these even according to the most sanguine reports and low estimates, are acknowledged to be carried out at a loss, and in most, if not all cases, the loss is very great.

Another very great economy can be effected by this system of utilisation—that is the cartage. These works can be placed at any convenient position in a town or parish, as the works can be conducted without the slightest nuisance to the neighbourhood, this having been practically proved by the Refuse Disposal Company having, even with the incomplete experimental works at Chelsea, carried them on for nearly five years, although closely watched for months by persons specially paid to do so, and by neighbours opposed to the works being placed in Lots Road. The Company have only once been summoned before a magistrate, and the case was adjourned and then dismissed, the nuisance being only the result of an accident.

That there is no nuisance is also amply confirmed by the fact that three Vestries, viz., Kensington, Westminster, and Chelsea, are daily delivering portions of their dust.

The question now arises are Vestries or Corporations to put up these works? Do their powers only permit them to spend the ratepayers' money, or can they carry on a trading process to save the ratepayers' money? That is a question they can answer; but it is my opinion that before very long we shall find the commercial world will take up the Company's process as a business of a very profitable character.

[*This discussion applies to the two preceding papers by* CHARLES JONES *and* JOSEPH RUSSELL.]

Mr. C. H. LOWE (Hampstead) thought that if all that Mr. Russell had described could be carried out, it would be a happy time for Vestries, but he had not any personal knowledge of the process. In Hampstead, after deliberating on the question of providing a Destructor for three years, they selected a site at some distance from

their district. The cost of removal and disposal of house refuse in Hampstead amounted to about eleven shillings per house per annum, or 6s. a ton. He thought that, although it was possible to realize something from the waste products by a process such as Mr. Russell had described, there would always be the cost of collection. This in Hampstead amounted to about £6,000; the carts being able to collect and deliver at the Destructor two loads per day. The Destructor in Hampstead consisted of eight cells, and cost about twenty-five shillings a day for working. The total cost of the Destructor was: £2,457 for land; building, £4,500; total, £6,957. The residuum from the Destructor was about 25 per cent., 16·5 clinker, 8·5 fine ash.

Mr. F. D. ASKEY (Hornsey) did not favour the now general idea of rendering noxious matters innocuous by means of fire. He thought that waste products should, as far as possible, be returned to the soil, or otherwise utilised. He hoped that Mr. Russell's process might be found practicable for general application. With regard to the Destructor at Hornsey, they had a Fume Cremator added to it, but did not find it necessary to use it so long as the firing of the furnace was carefully attended to. The chimney of the Destructor was 217 feet high. The cost of using the Cremator came to about £800 a year, as they found it necessary to use coke for firing. They had tried the use of coke breeze, but it caused large volumes of smoke.

Mr. ALLIOTT (Nottingham) thought it was an interesting question to what extent Mr. Russell's process was likely to pay; and there was another important question—supposing it to pay, was it desirable from a sanitary point of view? As the whole process consisted practically in sorting there was nothing that would destroy germs of disease that might be accumulated in the refuse. It was well known that all sorts of things find their way into dust receptacles, and although they cause no evil at the works may carry it elsewhere. That the Destructor is becoming more popular is shown by the fact, that during 1891 the number of new cells erected had added about 50 per cent. to the number of those already in use. With regard to the cost of using the Destructor at Hornsey, he thought that if they were unable to burn anything but large coke it was probably due to a want of knowledge of how to use the apparatus. At Leicester the cost of working the Destructor was 8d. per ton of refuse less the returns for by-products and steam power. If nitrogenous matter is to be returned to the soil, this would be effected to a much larger degree by adopting the pail system for the disposal of fœcal matter, than by any method of dealing with ashes and other house refuse.

Mr. C. H. COOPER, Assoc.M.Inst.C.E. (Wimbledon) said they were all interested in the experimental process being carried out by Mr. Russell at Chelsea. He wondered that the farms on London clay had not made more use of ash refuse for mixing with the soil.

The Wimbledon sewage farm had been greatly improved by trenching in house refuse. He did not see how they managed to cremate refuse at anything like 10d. per ton, taking into account the cost of labour and plant necessary. It had been suggested that house sewage could be mixed with the dust refuse, and burnt in the Destructors; but it was almost impossible to store this mixture without nuisance while it was waiting to be cremated.

The Chairman, Sir THOMAS CRAWFORD (Blackheath) thought that everyone would be struck by the products that Mr. Russell had been able to obtain from house refuse. There appeared to be two processes under discussion for dealing with this matter—cremation, and sorting and utilising. Hardly anything had been said during the discussion about the removal. This was important from a sanitary point of view, and was very bad in his own district. It was essential that this question should be dealt with before it came to the question of disposal. His sympathies were in favour of destruction by fire, from a health point of view, but he could not but approve of the efforts made for utilising these products.

Mr. J. RUSSELL (Chelsea) said that he did not think he had exaggerated in describing the products obtained from house refuse. People were glad to use the block-fuel made at the works, and he gave results of some tests as to its value. He saw no reason why house refuse should not be collected daily, the receptacles being taken away and fresh ones left; this would get rid of many evils now arising from house refuse.

Mr. C. JONES, M.Inst.C.E. (Ealing), said that he had visited the Separation Works at Chelsea, and was delighted to see the way in which every scrap was utilized. He thought it was wonderful how they managed to deal with so much material in so small a place, and the whole arrangement was so very creditable. With regard to the cost of working a Cremator he well knew that it might be made to spend a lot of money. At Ealing they had seven cells at work, costing only £1 16s. a week. They made a good use of the assets, and the final cost was 3½d. per ton of refuse dealt with.

THE AIR AND WATER OF LONDON: ARE THEY DETERIORATING?

By LOUIS C. PARKES, M.D., D.P.H.Lond.Univ., Lecturer on Public Health at St. George's Hospital, Medical Officer of Health and Public Analyst for Chelsea.

Read at a Sessional Meeting, March 9th, 1892.

FROM time to time, to those who are of a reflective turn of mind, and more especially to Medical Officers of Health who are so intimately acquainted with Public Health questions, the question suggests itself—is London a better place to live in, as regards health and comfort, than it was half a century or so ago? Those who are acquainted with the past and present conditions of life of the mass of the population, would answer largely in the affirmative, but nevertheless with certain reservations. There can be no question that the majority of the population is far better housed now than at any previous time in the history of London. Slums and rookeries have to a considerable extent disappeared; improved houses, and working-class dwellings of substantial character have been erected; streets have been widened; open spaces have been secured; and all classes have benefited enormously by the growth of practical sanitary knowledge in drainage, house sanitary arrangements, and sewerage. A public health service, on the whole of a very efficient kind, has grown up in London, and sanitation is now enforced in a way which 50 years ago would have appeared almost incredible.

Vast improvements, then, have been effected; and we see the results of the improvements in a lowered general death-rate, and in a greatly diminished morality from small-pox, scarlet fever, typhus, typhoid fever, and diarrhœa—diseases of the zymotic class usually said to be preventable. For instance, during the five years, 1886-90, the death-rate from small-pox in London was only one per million, as against 402 per million in 1841-50; during the ten years, 1881-90, the death-rate from scarlet-fever was 333 per million as against 1133 per million in 1861-70; during the same decennium the death-rate from

fever (typhus, enteric, and continued fever), was 205 per million as against 979 per million in 1841-50; and the death-rate from diarrhœa in 1881-90 was 749 per million as against 1030 per million in 1851-60. Virulent cholera has been practically extinguished during the past 20 years in London and in the country generally.

It is true that sanitary improvements have had little or no effect in lowering the mortality from measles and whooping cough—these being diseases of early childhood, over which it is extremely difficult to exercise any effectual public control. It is also true that diphtheria has shown a notable increase, and caused a heavy mortality in London during the past ten years, the death-rate for 1881-90 being 259 per million, as against only 122 per million in the preceding decennium, but this is no doubt the price we have to pay for our system of compulsory elementary education, which causes the aggregation of such large numbers of children in confined spaces.

During the past two years, also, influenza has been with us, and has raised the death-rate by some 2,000 per million during its visitations. We can at present only plead want of knowledge of how to exercise control over this disease in its epidemic form. It is certain that the ordinary methods of notification, isolation, and disinfection are—even if they were put in force—powerless to arrest the spread of the epidemic. They have not been put in force up to the present, however; and we are forced to be content with a policy of inactivity, whilst we watch the ravages of a communicable malady, a policy which furnishes a curious commentary on the limitations of human knowledge at the end of the nineteenth century.

With all its modern sanitary improvements, however, one, if not two, of the most vital factors of life in London, is undergoing steady, continuous degeneration. I allude to the air of London, and in a less degree to the water of London.

The degeneration of the air is due to the continuous growth of the town, which year by year removes the centre of the city further and further away from the country, and to the steady increase of smoke from coal fires poured into the atmosphere. It is a curious and interesting fact that London is dependent, one might say, almost for its life, upon the winds which bring pure air to it from the country. It is very seldom that the atmosphere in this climate is positively stagnant. Up aloft, above the chimney tops, there is usually, even on the calmest days, a just perceptible current, which serves to carry away the smoke and vitiated air, and brings fresh air in its place. When, however, during anticyclonic conditions, the atmosphere is positively stagnant, London, in winter, creates an atmosphere which is

positively irrespirable. I need hardly remind you of the week's fog just before Christmas last, nor describe in detail what you all probably experienced.

Nor is this fog to be wondered at when we consider that there are some 800,000 houses in London, each with half a dozen or more chimneys in communication with an open fireplace; that some seven million tons of coal are burnt annually in the metropolis, or some 20,000 tons a day—on a cold winter's day as much as 40,000 tons is said to be consumed—of which daily quantity 200 tons will escape into the air as fine carbon or soot, with probably an equal amount of sulphur as sulphurous acid. There will be also produced about 60,000 tons of carbonic acid to help vitiate the air. The latter, being a gas, would escape easily and diffuse with the fresh air were it not for the suspended sooty particles in the fog; and thus it is easy to understand that the air of a yellow London fog may contain 12 or 14 volumes of this gas in 10,000 parts, as against the normal 4 per 10,000. The evil is bad enough, but it is increasing. Every year some 15,000 or 16,000 new houses are added to London's huge bulk, each burning its due proportion of coal, and the number of foggy days in a year is gradually increasing.

The mortality and illness produced by a dense yellow fog in London is not difficult to demonstrate. For instance, the death-rate of London for the fortnight ending December 19th, 1891, when ordinary atmospheric conditions prevailed, was only 18 per 1,000. The great fog commenced on the 20th, and lasted until night time on the 25th. The death-rate of London for the fortnight ending January 2nd, 1892, was 32 per 1,000, or 14 per thousand in excess of the previous fortnight, and the aggregate mortality from diseases of the respiratory organs in the fortnight exceeded the corrected average by 829. As a matter of fact, the excessive death-rate was very largely due to lung diseases brought on or aggravated by the condition of the atmosphere in Christmas week. Little, if any, part of this heavy mortality can be attributed to influenza, as this disease did not become widely epidemic in London until after the first week in January; but the subsequent high death-rates in London, which then prevailed until the middle of February, are no doubt chiefly due to influenza mortality; although it may well be that the Christmas week fog prepared the way, so to speak, for the influenza, and weakened the defences of the body at the very time when it was most important that they should be at their strongest. At any rate, the epidemic through which London has passed has been far and away more fatal in its effects than either of its predecessors.

Fogs, however, are but exaggerated types of what London air is during all the winter months. They concentrate public attention for a time, but are soon forgotten, like all other experiences which are painful to remember. The smoke, normally present in winter in our atmosphere, cuts off a good deal of light, as witness the "duration of sunshine" records in London and in the country outside of London. Ozone is practically absent from the air of London, and the carbonic acid, even of the most open spaces, is usually about 0·5 per 10,000 parts in excess of that in country air. It is difficult to say what exactly are the effects of the deteriorated atmosphere on the health of Londoners; but I think it may safely be assumed that much of the anæmia, which is so characteristic of London citizens—the pale faces, and disordered digestions—and many of the wasting diseases of children, more especially rickets and scrofula, are to no small extent due to a condition of atmosphere which prevents the perfect action of the lungs, and the complete oxygenation of the blood, and so lowers the tone of the body and the ability to repel the invasion of disease. There is also the irritant effect of the dust and soot particles breathed into the lungs and deposited in the bronchial glands. These foreign particles are not obviously injurious to the majority of people, but they may affect some. In any case they do no good.

We must next consider what remedy, if any, there is for this evil, affecting, as it does, a population of four and a half million people, and increasing, as it does, in magnitude year by year. Many people are inclined to look on London fogs as natural phenomena inherent to London's site and climate, and therefore incapable of remedy. But this is a grand mistake. White mists are, no doubt, inseparable concomitants, under certain atmospheric conditions, of low lying positions on tidal rivers not far away from the sea; but yellow fogs are the products of coal combustion mixed up with nature's white mists, the latter being of a comparatively harmless kind, and limited more or less to night-time, as they are rapidly dispersed by the sun's rays.

It is now generally acknowledged that at least 95 per cent. of the smoke in London issues from the chimneys of dwelling-houses, the other 5 per cent. being "manufacturing" smoke. Consequently any attempt to deal with the smoke nuisance must aim at controlling the methods of combustion adopted by the householder. The manufacturer is already within the law; but the chimneys of private dwelling-houses may pour out as much black smoke as they can, with impunity. I am not an expert in this matter, and I have brought this subject forward more with the view of giving an opportunity to those Fellows,

Members, or Associates of The Sanitary Institute, who are well and practically acquainted with methods of heating and of smoke prevention to express their opinions than to air my own views. After the discussion it may be possible to formulate some resolution which will carry the sense of the meeting, and will show the public the lines upon which The Sanitary Institute is of opinion that the question of smoke abatement in London should be approached.

I will, however, propound the following as being questions to be discussed, and if possible decided one way or another.

(1) Is it reasonable to hope that the voluntary adoption in old houses, or the compulsory enforcement in new houses of smoke preventing stoves designed to burn ordinary domestic house coal, will visibly and satisfactorily abate the smoke nuisance in the metropolis?

(2) Can the use of anthracite or other smokeless coal be made compulsory throughout London, to the exclusion of ordinary house coal, having regard to the fact that such coal is not well suited to burn in ordinary domestic open fire-places, and that the present output is said to be at present only some 4,000 tons a day—London alone requiring on an average at least 20,000 tons a day?

(3) Is it possible to adopt, and render acceptable to the bulk of the ratepayers, a system (municipal or by private enterprise), of heating houses by steam or hot water pipes?

(4) Is the remedy to be looked for in the municipalisation of the London gas undertakings, with the production of a cheap gas at 1s. or 1s. 6d. per 1000 cubic feet? For at this figure gas could be used for heating purposes as cheaply as coal at 20s. per ton, equal heating effects being produced in dwelling-rooms by open gas fires of good design, as by coal fires.

With reference to this latter question, subsidiary questions arise as to whether (*a*) it will be necessary to supply a gas free from illuminants, to be used for heating and cooking purposes only; and (*b*) to manufacture the gas in the colliery districts at the pit's mouth, and supply it to London through enormous mains under graduated pressure; in order that the price may be so low as to allow gas to compete successfully against coal.

I have said nothing as to the adoption of systems of slow combustion close stoves in houses, heated by coke or smokeless coal, as it appears to me that our climate, our habits, and our customs do not admit of, and indeed are strongly opposed to the system, which answers, however, well enough in countries with very cold and prolonged winters, when the chills and draughts produced by open ventilating fire-places would be intolerable. It seems as if no system of heating could be adopted in this

country, which does not preserve, more or less intact, the open hearth, the cheerful blaze or glow of incandescent particles, and the escape of a large quantity of heated air up a flue, constituting the ventilation.

All this is very much against any general adoption of hot water or steam heating in ordinary dwelling-houses; and as far as my own experience goes, smoke preventing stoves are only smoke preventing when properly managed, disobedience to instructions, or carelessness, usually meaning a production of smoke in considerable quantity. The choice seems therefore to lie between the compulsory use of smokeless coal; or the taking of such steps by the citizens, as a whole, as will secure the enormous cheapening of coal gas, and then by placing a tax on all kinds of coal grates, or even upon smoke-producing coal itself, to render it more economical for everybody to burn coal gas as a fuel.

It is true that coal gas produces, for equal heating effect, as much carbonic and sulphurous acids as coal does, but the absence of the suspended carbon soot particles makes all the difference as regards yellow fog. Without the suspended sooty particles in the air to form a nucleus for the moisture, the gaseous products of combustion will be enabled to escape into and diffuse with enormous masses of fresh air, and the dark, black, acrid, suffocating, choking atmosphere, which constitutes the modern London fog, will become a thing of the past. This sounds, perhaps, very optimistic and improbable, but *it is* feasible to restore purity to the London air, if we only set about it the right way. That the results of abolishing smoke would be remunerative, and well worth the vast outlay needed in the first instance, is a statement of the truth of which I am firmly convinced.

As regards the water supply of London, I am afraid we are working within a vicious circle, as we are doing with our air. Year by year London increases in size and population. Year by year the towns and villages, and London suburbs in the Thames and Lee valleys, are increasing as rapidly. The water drawn from the Thames and Lee has consequently to supply an ever increasing population, and the limits will before long be reached, when the resources of these rivers as reservoirs of water, will be stretched to their uttermost.

As the villages and towns on the upper reaches of the rivers and their tributaries increase in size, there is a constantly increased tendency for larger quantities of the waste refuse of these communities to find their way into the streams and rivers which are the natural drainage beds of the localities. This tendency to increase in pollution can only be kept in check

by the watchfulness and devotion to duty of River Conservators, and by increased effort on the part of the water companies in the filtration and purification of the water they supply.

One of the special drawbacks of the Thames and Lee water companies, is the compulsion they are under to take in water from the river, when it is in flood, owing to the insufficient capacity of their storage reservoirs. The turbid and foul water from the river in flood is most difficult to filter effectually, with the result that a coloured, turbid water, containing an undue amount of organic matter, is at such times supplied to the consumers in London. This happened notably last autumn, when, owing to the continuous heavy rains, the Thames was in flood for a very long period, and the water supplied by a great majority of the Thames water companies to London was distinctly much inferior to the average quality. Who can say how much illness and loss of health was attributable to that wholesale depreciation in quality of our water supply?

It will not be amiss to turn to the Reports of the Official Water Examiner to see for ourselves what was the quality of the water supplied to London in 1891.

"At the end of January," writes the Water Examiner, "a practical illustration occurred of the incapacity of the existing works for dealing with the excessively turbid water which the Thames ocasionally affords. The breaking up of the prolonged frost, and the rainfall of the 29th January, produced a flood in the river of exceptionally muddy and polluted water. The filters having already suffered in condition from the great difficulty experienced in cleaning them when covered with ice, were overtaxed by the turbid water which was unavoidably admitted, and the supply delivered into London on the 30th January, and for some succeeding days was much discoloured." Dr. Frankland reported in February that the water abstracted by the Thames companies was, in all cases, of very inferior quality, being polluted by an abnormal amount of vegetable organic matter. That of the Grand Junction Company, supplied to over half a million of people, on the 5th February, surpassed, in respect of organic impurity, any sample of Thames water examined during the past 25 years. It was opalescent from imperfect filtration, and was not in a fit state for dietetic use.

After a time the water appears to have regained its average standard of purity, but in September we find it again reported that the water abstracted from the Thames suffered considerable deterioration in consequence of the flooded state of the river. The supply of the Chelsea Company was least affected, this company having the largest storage capacity for unfiltered

water, viz., 14·1 days supply, or more than double that of most of the other Thames companies.

In October we find that the water abstracted from the Thames by all the companies, except the Chelsea, was very seriously affected by heavy floods. It was brownish in colour, and the organic matter in solution, although chiefly of vegetable origin, had been increased in amount to a very objectionable extent. "It is evident," writes Dr. Frankland, "that these companies, with their present limited storage, are unable to avoid the delivery of polluted flood water."

In November the Thames water supply had generally improved, but it was then the turn of the Chelsea Company to fail; and the water supplied by this company, which was far the best in October, was the worst in November, and contained 73 per cent. more organic matter than that supplied by the Lambeth Company on the same day.

In December the Chelsea supply had improved, but that of the other Thames companies had again fallen back, the excessive floods in the Thames Valley continuing and rendering it "most difficult for the companies, who have but small storage at their command, to send out water fit for dietetic use." The water of the Southwark Company was, indeed, opalescent from finely suspended clay, which was not removed by subsidence or filtration.

From the above quotations it will be seen that during five months of the year 1891, the water supplied to London from the Thames was for the most part of inferior quality, and on several occasions for day's together not fit for dietetic use, that is to say *not safe to drink*. The river Lee is also liable to flooding, and the water abstracted from its lower reaches by the East London Company exhibited fluctuations in quality similar to those affecting the Thames. The only water supplies to the Metropolis that maintain a good standard of purity throughout the year are those of the New River Company from the upper reaches of the Lee, which are comparatively unaffected by floods, and the deep well-waters of the Kent, Colne Valley, and East London Companies, the latter being invariably described as of excellent quality.

Of course it is open to any one to say, that the year 1891 was an exceptionally bad one for the water companies owing to the severity of the frost in the early part of the year, and the tremendous rainfall in the latter part of the year. This may be granted, but still I think we shall all agree that the water supply of London with its $4\frac{1}{4}$ million of inhabitants ought to be independent of exceptional circumstances of all sorts. As a matter of public health it is not a wise policy, and it is certainly not a scientific proceeding, to take in grossly polluted waters, such as the Thames or Lee in floods are, and then endeavour to render them potable by storage and filtration through sand and gravel. The endeavour is not always a successful one, as I have shown from official reports, and surely at the end of the 19th century, the citizens of the wealthiest city in the world, have a right to ask that the water supplied to them for domestic purposes shall be, like Cæsar's wife, above suspicion.

Major Lamorock Flower (London) said he was much interested in Dr. Parkes' remarks on smoke abatement, but he thought it would not be reasonable to make every one alter their stoves nor to institute a house inspection to see that proper stoves were in use. Some difficulty would arise in making the use of anthracite compulsory, and, moreover, if brought into general use, there would not be enough anthracite to supply the demand. Means had been found of reducing the smoke from bituminous coal by treating it chemically, but this did not find favour with the public on account of the trouble it involved. The suggested use of steam and gas for heating purposes would, he thought, never find favour with the English public. With regard to the water question, it was absurd to talk of the Lee being dried-up. A considerable quantity is taken, but it still will find an additional 10,000,000 gallons daily. The pollution of rivers could be almost entirely prevented by proper inspection. In the Lee, for instance, the water at the intake of the water-companies is equal to the purity of the river at its source; but in the Thames the present procedure against offenders is too cumbersome. He believed that it would be proved that there is plenty of water in the Thames and Lee water-sheds for the supply of London: and he thought the London County Council had gone mad on the idea that another source of supply must be found. It would be fifteen years before Welsh water could be brought into London, and in the meantime nothing or little would be done to improve the present source of supply.

Mr. Rogers Field, M.Inst.C.E. (London), said he suggested some years ago that the use of smokeless fuel might have been encouraged by only remitting the "coal dues" on this kind of fuel, and leaving them on ordinary smoke-producing coal. The great difficulty in the question of smoke and fog is to convince people that it is necessary to deal with it. Ordinary Londoners think that they cannot help the fogs, and that after all fogs do not do much harm. That this view is a mistaken one is shewn by the fact that directly after serious fogs there is a great increase in the deaths from diseases of the respiratory organs. It is no use saying you *cannot* deal with the fog; you *must*, if fogs make it impossible to live in London, and things certainly seemed to be tending that way. On the question of the water supply, he

thought the comparative purity of the Lee was due to the fact that the whole valley, including the tributary streams, was under inspection. In the Thames only the main stream and ten miles up the tributaries were under inspection, and this was not sufficient, as a great deal of pollution was brought down by the higher portions of the tributaries. It would be a long while before London could obtain its water supply from other sources, though it may be necessary eventually; in the meantime the present sources of supply ought to be thoroughly inspected, and the supply made as good as possible. He could not agree that London could rely altogether on the Thames and the Lee for its water supply. The large amount of manured land in the water-shed of these rivers would always considerably add to the pollution. He thought that the whole question of the sources of supply should be dealt with in reference to the needs of the country at large. Dartmoor, Wales, the Lakes, and some areas in Derby, were practically free from pollution, and he thought that all available sources of supply ought to be mapped out and allotted to different districts. He moved that, "In the opinion of this meeting of Fellows, Members, and Associates, of The Sanitary Institute, Parliamentary permission should be withheld from all large appropriations of water-bearing areas in Wales or elsewhere, until the Royal Commission on Sources of Water Supply about to be appointed has reported."

Mr. F. T. Poulson (Chelsea) seconded the resolution. He was glad that the Birmingham Water-bill should be the means of making London look to its water supply. There was no doubt that fogs caused a good deal of injury to child-life, and destroyed comfort. Gardening in London is a good indicator of the purity of the air.

Dr. H. R. Kenwood (London) said that with regard to the prevention of fog he thought that the adoption of coal-gas in place of coal was the most likely to be adopted, but the question arose as to what the injurious effect of fog is due to, and whether the burning of so much gas would prove an advantage to the public health. By the universal adoption of coal-gas for heating purposes we should certainly be spared the dark and dirt of our London fogs, but it is a question whether the very large amount of injurious gases which would escape into the atmosphere as products of coal-gas combustion, and which—under those atmospheric conditions which give rise to fog—would be held down over the city to be respired, would not suffice to render the air just as injurious as it is under the present circumstances. He thought it might be possible to find some source of heat other than that of coal or coal-gas combustion.

Mr. S. C. G. Fairchild (London) thought that a good deal of the pollution of the Thames in dry seasons was due to the house-boats on the river. He asked whether it was a fact that water passed through crushed flints, absorbed silica, and prevented the water acting on lead-pipes.

The Chairman (Sir Thomas Crawford) said he quite agreed with the resolution proposed by Mr. Field with regard to the water-supply of London. He thought that the attention of the public had been principally directed to the surface water, but that we should also consider the water-bearing strata underlying the Thames and the Lee, where possibly we might find a great augmentation of our present supply. In most cases the sub-soil is a great store-house of water. If surface water is used, it is of great importance to secure gathering grounds free from impurities. With regard to fogs, he was particularly struck with the health aspect of the question, and he thought it would be very useful if every health officer would estimate the consequence of exposure to fogs, and suggested that the degeneration of Londoners might be due to fogs.

The resolution proposed by Mr. Rogers Field was carried unanimously.

Moved by Dr. H. R. Kenwood and seconded by Mr. Coates, and carried unanimously, "That it is important in the interests of the public health that London fogs should be enquired into by a Royal Commission."

Dr. Louis Parkes (London) in reply said, no doubt the physique of Londoners was degenerating. With regard to the uselessness of inspecting only ten miles up tributary streams he instanced an outbreak of typhoid by which pollution was carried into the Wey and so to the Thames.