1883-4.

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Sanitary Institute of Great Britain.

VOLUME V.

CONGRESS AT GLASGOW.

1883-4.

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Sanitary Institute of Great Britain.

FORMATION OF THE INSTITUTE.

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

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

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

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

BASIS OF THE CONSTITUTION OF THE INSTITUTE.

SECTION I.

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

As soon as practicable a Charter of Incorporation shall be obtained, as it will facilitate some portions of the work of the Institute, more

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

especially the examinations as set forth in Section II. Until a Charter is obtained, the examinations shall be continued as heretofore, and a Register of persons certificated as competent to act as Local Surveyors and Inspectors of Nuisances shall be formed.

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

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

All Fellows (except those who have already become Life Members) shall pay a fee of Ten Guineas on taking up the Fellowship, and such fee shall entitle the Fellow to all the privileges and advantages of the Institute for life without further payment.

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

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

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

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

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

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

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

Persons of either sex, interested in the advancement of Sanitary Science, shall be entitled to be enrolled as subscribers on payment of One Guinea annually. Annual Subscribers shall be entitled to attend and to take part in the discussions at all meetings and Congresses of the Institute, and shall have free admission to the Conversazioni and Exhibitions of Sanitary Appliances held in connection with the Institute, so long as they continue to pay their Subscription.

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

Subscribers of Half-a-Guinea to any Congress of the Institute shall be entitled to a card of admission to the Meetings, Addresses, Conversazioni, Excursions, and Exhibition held in connection with that Congress.

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

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

Section II.

Objects of the Institute.

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

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

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

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

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

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

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

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

Fellows, Members, Associates, and Subscribers shall have the right

of Free Admission to the Exhibitions of the Institute whenever they are open. All fees payable by Exhibitors and the Public shall be fixed by the Council and belong to the Institute.

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

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

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

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

A Library shall be formed in connection with the Institute.

ANNUAL REPORT OF THE COUNCIL

FOR 1882-3.

In presenting this the Sixth Annual Report to the Fellows and Members of the Institute, the Council would remark that the objects of the Institute are being gradually attained, and they are glad to record marked progress in the Examinations and Exhibitions.

The Anniversary Meeting of the Institute was held in the Theatre of the Royal Institution, by the kind permission of the Board of Managers, on July 13th, 1882. His Grace the Duke of Northumberland, President of the Institute, occupied the chair, and a paper on "The Work of the Sanitary Institute of Great Britain," was read by E. C. Robins, F.S.A., F.R.I.B.A. The paper has been published in Vol. III. of the Transactions of the Institute.

The Fifth Autumn Congress of the Institute was held at Newcastle-upon-Tyne from September 26th to 30th by invitation of the Mayor and Corporation. Captain Douglas Galton, R.E., C.B., D.C.L., F.R.S., presided. The papers read at the Congress, which have been published in full in Vol. IV. of the Transactions, are well worth the careful attention of the Members. A very large amount of interest in the meeting was shown both by the Metropolitan and Provincial Press, and the papers and discussions were reported by them at more than usual length.

Several well-arranged Excursions were held in connection with the Congress, especially one to Alnwick Castle, by the invitation of His Grace the Duke of Northumberland, President of the Institute, at which about 250 persons were present.

The Exhibition was very satisfactory, and, in many respects, the best, although not quite the largest that has been held by the Institute. There were 110 exhibitors and 600 exhibits; 12 Medals, besides the Richardson Gold Medal, which had not been awarded since 1878, and 70 certificates were awarded at the close of the

Exhibition, and 37 exhibits were deferred for further practical trial; the result of these trials will be made known, and the medals and certificates will be presented, at the Anniversary Meeting in July next.

The Exhibition was visited by 8,373 persons.

During the year two Examinations for Local Surveyors and Inspectors of Nuisances were held by the Institute. At the Examination in June, thirteen candidates presented themselves, four for Local Surveyors and nine for Inspectors of Nuisances. Two candidates were Certificated as competent to discharge the duties of Local Surveyors, and eight as competent to discharge those of Inspectors of Nuisances.

At the Examination in November, eight candidates presented themselves, two for Local Surveyors, and six for Inspectors of Nuisances; one candidate was certificated as competent to discharge the duties of Local Surveyor, and five as competent to discharge those of Inspectors of Nuisances.

The Council are glad to report that there is a steady increase in the numbers attending the Examinations, and in the towns and corporations who recognise the value of the certificates granted by the Institute.

The Council much regret that they have to report the death of Dr. William Farr, C.B., D.C.L., F.R.S., the most eminent statistician of all matters relating to public health, who materially assisted in the inauguration of this Institute, and was from the first one of the Vice-Presidents, and of Major-Gen. H. Y. D. Scott, R.E., C.B., F.R.S., a former Member of Council. Votes of condolence and sympathy with the relatives were unanimously passed at the meeting of Council on April 26, 1883. They have also to regret the death of Dr. T. Moffat, Fellow, and of Dr. R. Elliot, W. Molyneux, and Dr. Prall, Members.

There have been elected since last Annual Meeting 3 Fellows, 20 Members, and 7 Associates. The numbers now on the Roll of the Institute are 88 Fellows, 192 Members, 20 Associates, 21 Subscribers, and 30 Honorary Foreign Associates. Total, 351.

The retiring Members of Council this year are Henry C. Burdett,

F.L.S., F.S.S., T. W. Grimshaw, M.A., M.D., James Lemon, M.I.C.E., F.R.I.B.A., F. Maxwell Lyte, F.I.C., F.C.S., William Ogle, M.A., M.D., and The Rev. F. Temple, D.D., Lord Bishop of Exeter.

Vol. III. of the Transactions has been published during the year. The interest of the volume is well kept up by the papers, and abstracts of papers, read at the Ordinary Meetings during 1881 and 1882, with the long discussions upon them.

Vol. IV. has also been published, and contains an account of the Congress and Exhibition at Newcastle-upon-Tyne in 1882.

The proposed Government measure for the municipal government of the metropolis was considered so important by the Council that they have sent a communication to the Home Secretary suggesting that provision should be made in the bill for securing proper qualifications on the part of Sanitary Officers appointed under the Act.

The Council have now under consideration the question of the notification of infectious diseases, and are collecting information from those towns where compulsory regulations are in force, with a view to holding a Meeting of the Institute to discuss the subject.

The Congress and Exhibition this year will be held at Glasgow, an invitation from the Lord Provost and Town Council having been accepted during the Meeting at Newcastle. The Council confidently hope that the visit to this one of the most important towns in the kingdom, will prove to be the most successful of the Congresses, not only in the value of the papers and the success of the Meeting, but also in assisting the general advance of the interests of the Institute. Under these circumstances the Council rely on a full attendance of members.

SANITARY INSTITUTE

Abstract of Cash Receipts and Payments

	£ s. d.	£ s. d.
To Balance at Bankers as per Pass-Book of the Institute, December 31st, 1881, viz.:—		
Wyatt Edgell Fund	200 0 0	
General Account	49 9 1	
		249 9 1
To Fellowship Fees	63 0 0	
„ Admission Fees	43 1 0	
„ Life Compositions	46 4 0	
		152 5 0
„ Annual Subscriptions		160 13 0
„ Examination Fees		37 16 0
„ Sale of Publications		10 19 2
„ Loan from Members of Council ..		100 0 0
„ Report on Sanitary Exhibition ..		47 0 0
		£758 2 3

EXHIBITION

	£ s. d.
To Balance 1st of January, 1882	52 3 8
„ Receipts	488 3 4
	£540 7 0

Audited and found correct with the books of the Institute,

MAGNUS OHREN,
ERNEST TURNER, } *Auditors.*

April 28th, 1883.

OF GREAT BRITAIN.

for the Year ending 31*st December*, 1882.

	£ s. d.	£ s. d.
By Expenditure :—		
Office Furniture..	11 12 10	
Rent and Taxes	52 2 0	
Salaries and Wages	154 5 0	
Postage, Telegrams and Carriage	31 11 4	
Incidental Expenses	39 7 0	
Stationery and Printing ..	29 2 9	
Ordinary Meetings	31 11 0	
Examination Expenses	37 5 3	
Library	2 6 1	
Congress	87 12 8	
		476 15 11
„ Wyatt Edgell Prize		200 0 0
„ Report on Sanitary Exhibition ..		47 0 0
„ Balance at Bank December 31st, 1882		34 6 4
		£758 2 3

ACCOUNT.

	£ s. d.
By Expenditure	281 14 4
„ Balance at Bank December 31st, 1882	258 12 8
	£540 7 0

NOTICE.

The Institute, as a body, is not responsible for the facts and opinions advanced in the Addresses and Papers published in its Transactions.

THE RELATIONSHIP BETWEEN GEOLOGY AND SANITATION.

ADDRESS BY W. EASSIE, C.E., F.L.S., F.G.S.

Anniversary Meeting, July 12th, 1883.

THE few remarks which I shall have the honour of making to-day in your presence, will bear upon the relationship between Geology and Sanitation, or what would broadly be called Health. They will in no way treat upon the relationship between Geology and Sanitary Engineering, or any of the remedial measures taken from time to time by man, to counteract any unhealthy Geological surface presentations. To follow out my subject faithfully, I must also eschew all matters connected with Botany, *per se*, although I may be obliged to refer occasionally to some actions of vegetation, which may affect the healthy conditions of some Geological underground formations and superficial deposits. Neither do I consider it within the province of my subject to deal with Meteorology or with Climatology, because the relationship of these subjects to Health are vast, requiring independent treatment, which I trust they will receive at the hands of the distinguished members of the Meteorological Society, who are now members of our Institute. I take it for granted that the earth was made for man, and not man for the earth, and inasmuch as the earth is simply a speck, or almost so, in our solar system, the relationship between Health and the Meteorological laws bearing upon our earth's crust, really call for a separate grand division of our subject.

I only seek in this short address to present you with a few instances where Geology becomes the handmaiden of healthiness, or otherwise, to the beings born upon its surface; and the time at my command will not allow me to treat of any of the modes in which our terrestrial habitation is fouled by its present or past possessors. I shall say as little as possible upon Mineralogy, although it is very intimately bound up with the lithological character and constitution of our rocks.

With Geology, as a producer of stone, slate, and other substances which go to make up our habitations and pave our

streets, and so forth, I have nothing to do. Neither can I treat its relation to the Soil, its mechanical relations, density, division, adhesive power, capacity of attracting and holding air, of containing water; its capillary power, its relation to the atmosphere, its relation to heat, and its power of retention of the same. We have nothing to do either with the application of chemistry to Soils, or as to whether they may contain anything inimical to vegetation, or be, agriculturally speaking, short of any factors for general usefulness. We have nothing to do with the improving and enriching of soils by chemical or natural applications, or with the mixing of certain clays with soils and sands; with their pauperization by too frequent cropping, or with the improvements made possible in them by means of weeding and draining. All we need now take into consideration is where Geology and Health-essentials come into natural contact.

Without going into the question of food production in any detail, there can be no doubt that a man's health depends upon the kind, quality, and quantity of the food which he consumes, and inasmuch as all foods are derived from the earth—whether animal or vegetable—and are obtainable according to the rate of production, it may be wise to consider for a moment the very wonderful powers which some strata possess over others.

Let us consider agriculture only. The student will find that the productiveness of soils, as remarked by Mr. Chambers, has no relation to the Chronological succession of the various formations.

"The mere Geological composition of soils afford no very reliable criterion of economic value. The same rock that produces the almost barren soil of Argyllshire, weathers into the fertile soil of the Channel Isles, and to the Old Red Sandstone is due at once the rich soil of Hereford and Monmouth, &c, and some of the most barren heaths and moors in Scotland."

The bulk of the tertiary formations are, however, very fertile. With regard to the thin soils overlying the chalk, they are of little value and do not retain moisture. When the chalk, however, is found naturally covered to some depth, with sands and clays, considerable fertility results. The Lias and Oolitic formations furnish valuable clays of great richness, but they require considerable labour and attention.

Perhaps the highest per centage of valuable land is found associated with the Old Red Sandstones, and Limestones, and Marl beds. The same may be said of the Mountain Limestone and New Red Sandstone. As for the igneous rocks, though exhibiting much fruitfulness where well disintegrated, their value, as a food producing superficies, is not great.

Changing the subject, let us now regard the kinds of formation chosen by the earliest civilized people in, for instance, our own country. We shall find this of interest. It has been truthfully observed by Mr. Topley, of the Geological Survey, that the outcroppings of divers Geological formations, "are marked by the occurrence thereon of numerous villages, whilst certain neighbouring formations are almost without any." Mr. Prestwich remarks that London was first peopled upon its gravel bearing surfaces, because these readily yielded good water. Where the eastern part of Northumberland, says Mr. Topley, presents isolated areas of a certain Sandstone, these rocky patches contain the ancient villages and most important hamlets. This was because the soil was dry, and pure springs occurred at the edge of the clay. Of course, the sites of more modern villages have been chosen because of the underground mineral wealth, but this is only a further instance of the power exerted over man by Geology. In the district alluded to, out of twenty-three villages, thirteen were at first built upon rock, six upon sand, and only one upon clay. Elsewhere he shows that narrow bands of clay are rarely found to be the sites of villages, and houses are even scarce; also that while wide clay areas are sparsely populated, on the intermediate formations of sand and Limestone, villages abound. It will also be found that a "relation exists between the boundaries to which these villages give their names, and the great physical features caused by the outcropping of certain strata." It appears absolutely certain that the land divisions of the south-east of England, have a well marked and constant relation to these great physical features. The position of the parishes was not the result of accident, or according to an order from Church or King, but resulted from these same great physical features. It has also been remarked by another author, that "no less than nineteen of the largest and most important towns in England, from Exeter to Carlisle, are all situated along the line of one Geological formation, the New Red Sandstone, which, in addition to its own mineral treasures of rock, salt, gypsum, soda, and metalic ores, usually covers the invaluable deposit of coal, at once yielding an incentive and supply to the vast and enterprising population of this favoured district." Here is another case where Geology directly affects the habitat and condition of man.

When Geology was comparatively a young Science, it was nevertheless common to compare the chalk with its clean soil, clear air, and pure water, to the foggy atmosphere and impure water supply of the London clay. The dry nature of a sandy soil, was also compared with the moisture and malaria of a

marshy district. This was first observed by Mr. G. F. Richardson and comprehended pretty much all that Geology was supposed to have in common with Public Health. Since then, however, we have begun to particularise. For instance, we say, that buildings erected upon the Limestones, such as the Mountain Limestone, and the Oolitic Series and on well-drained sands, are built upon dry ground. If built on the Marlstone, the subsoil would be termed more moist—if built on the Lias or alluvial ground, the soil would be denominated a damp one.

It should be borne in mind, that throughout this paper, I have, on nearly every occasion, when quoting an Author, been obliged to condense his remarks into the smallest possible space, I trust without spoiling the sense.

But there is one passage which I must, perforce, quote in full, it is so true, and so suggestive, and bears considerably upon our subject, because there can be no health, as Juvenal suggests, unless there be a sound mind in a sound body.

The sentence was written by Mr. G. F. Richardson, and is as follows, "The moral and social feelings of the inhabitants of particular districts are alike influenced by Geological situation; and the enterprise of the islander and the local patriotism and attachment to home of the mountaineer, and the native of primary districts, are (often without the consciousness of the parties themselves) inspired by the physical geography of their native region."

Such an argument as the above, but with a more direct bearing upon our subject, might be reasoned out in respect of the various classes of workers, which are associated with divers Geological Formations. In the huge iron districts, where coal and iron abound, where men—day workers and all night workers—are herded together in the smallest possible space, so as to be near their furnaces and rolling mills, one would not expect to find the robust health and longevity enjoyed by the fishermen on the sea coast. Neither would one look for a community of husbandmen upon hills formed of hard slaty rocks, with scarcely any soil upon them, on account of their great resistance to decomposition. Thus upon the granitic formations, which have never been abraded, or been covered during the glacial era with many kinds of soils—as in the case of the Highlands of Scotland—one would expect to discover little else than wild game.

It is very different in the case of the great central valley of Scotland, termed by Professor Ramsay, one of the most fertile areas in Great Britain; here are farmers by the thousands, and the highest condition of agriculture. It is curious also to note, that upon the Old and New Sandstones and Marls in Devonshire, Herefordshire, and Gloucestershire, &c., where many

crops are grown, the above districts are termed the great tree districts of Great Britain, and are famous for apples and pears. Those healthy beverages, cider and perry, so largely consumed by the agricultural population, have, therefore, a direct association with the characters of the rocks, seeing that they will not flourish upon other soils. It is another very curious fact, that the plain of the Carse of Gowrie, also famous for its apples, is situated over a tract of the Old Red Sandstone.

It is singular, taking England as an example, that the distribution of certain diseases largely depends upon the absence or otherwise of valleys and rivers, along which the winds can sweep without interruption, in other words, upon the physical conformation of our Island, as it was left at the end of the last Geological epoch, when it became fit for the residence of man. I will mention one or two instances, and the lessons which they teach would amount to this, that before making choice of a locality for people subject to certain ailments, it is wise to take its Geological structure into consideration. Dr. Alfred Haviland says, after years of study on this matter, that "those coastal counties most exposed to the prevailing winds, and most free from obstructions to their full operation, have the least mortality"—due to heart disease—"whereas those coastal counties, such as those along the South Coast, which have barrier-like rocks, and other characters which tend to interfere with the full sweep of the sea winds, are those which have a high mortality." Where the precipitous and wall-like rocks are intersected by every variety of sea inlet, opening into wide valleys through which the winds can scour along, there is a lower mortality. He also remarks that "coincident with the lowest exposure to the sea, as in the Midland counties, is the highest mortality of heart disease in those counties, and the lowest amount of mortality is coincident with the greatest amount of exposure. The counties which lie intermediately between these extremes, have also an intermediate amount of death rate." His conclusions have been worked out with the extremest care, accompanied with maps. As an example, it may be instanced that the East Yorkshire group of counties, which is bound by a precipitous coast of Oolite and chalk cliffs, say from Whitby to Bridlington Bay, and has no sea inlets, with an inland directed water shed, these counties have a high mortality. The low coast of sea-board between Bridlington and the Isle of Sheppey, differently situated in respect of offering no check to the winds, has a very low mortality. These conclusions are well worthy of attention and are of serious moment, seeing that the mortality from heart disease and dropsy, amount to more than one seventeenth part of the

mortality from all causes. London, as a division, has a low mortality, and coincident with this, it is traversed by the great sea inlet, the Thames, with a twice a day average rise of the tide, between sixteen and twenty feet.

About fifteen years ago, Dr. Buchanan examined three of the Southern counties of England, with regard to the distribution of phthisis or consumption, and without going into the details of his report, I will give his conclusions which are as follows:—

"Within the counties of Surrey, Kent, and Sussex, there is, broadly speaking, less phthisis among populations living on porous soils, than among populations living on impervious soils."

"Within the same counties there is less phthisis among populations living on high-lying pervious soils, than among populations living on low-lying pervious soils."

"Within the same counties there is less phthisis among populations living on sloping impervious soils, than among populations living on flat impervious soils."

"The whole of the foregoing conclusions combine into one—which may now be affirmed generally, and not only of particular districts—that, wetness of soil is a cause of phthisis to the population living upon it."

Dr. Haviland, a few years ago, writing upon phthisis in females, says that "the warm fertile ferruginous Red Sandstone tracts of country are remarkable for forming the sites of the most extensive series of low mortality groups throughout England." The high elevated ridges of non-ferruginous and unfertile carboniferous limestone and coal, and the elevated, hard, unfertile non-ferruginous silurian for the sites of the most extensive series of high mortality groups."

It is pleasing to know that the truthfulness of the above has been proved by the great lowering of the death rate where districts have been sewered and drained. Dr. Buchannan is a cloud of witnesses in himself upon this point. Dr. Wilson has also stated that in the Kelsoe district, fever and ague, which formed nearly one-half of the diseases of the population, almost wholly disappeared in ten years, consequent upon the general extension of an efficient drainage through the neighbouring country.

Passing to the subject of Cholera visitations and their relationship to certain subsoils, some curious facts present themselves. I would prefer for the present to consider Malaria and Cholera in the one group, seeing that there are certain Geological associations. In manifesting partiality for the alluvium of the River Ganges, say Drs. Lewis and Cunningham in 1878, Cholera is not singular. Malaria and kindred diseases flourish

about the deltas of large rivers everywhere. Malaria, they continue, resembles Cholera markedly in this, that in many localities, such as the swamps of South Australia, both are equally unknown. The distribution of Malaria is not less inexplicable than that of Cholera, as for example, its occurrence in the Oases of the Desert Sahara, in North Africa. They further add that the history of Cholera throughout India presents one common feature, and that it can only be fairly regarded as endemic in such localities as manifest a close resemblance to the more superficial layers of their Geological formation.

In 1832, when Cholera first appeared in Paris, M. Boubeé, after long researches satisfied himself that there was an essential connection between the geological condition of the earth, and the tendency manifested by Cholera to devastate certain parts, while it left others untouched. He says further, that in countries where endemic diseases exist, as in those where epidemics were frequent, he found that the disease in almost every country, was limited by the area of the geological formation, and that each geological basin constituted a natural seat for morbid affections—in short—that the "Medical constitution" of every country depended on its geological constitution, in all cases where this Geological constitution showed a distinctly traced character. The Cholera in Paris was most virulent and most marked in those parts where there were tertiary or alluvial strata, and it made but little progress, if any, in those countries where there existed non-absorbing rocks. He gives several curious facts in support of this theory. For instance, in Lyons there were fatal cases only in one faubourg, and that occurred on diluvial soil. But owing to the rest of the town being partly built of granite and standing upon it, these portions escaped. The same association between soils encouraging evaporation and exhalation was noticeable during an outbreak of Cholera at a place in Brittany, and it was discovered, that there exists there a little basin of tertiary strata, not found elsewhere, and moreover, the whole soil of the place attacked is covered with diluvial deposit.

I think it may be taken for granted that the districts ravaged by cholera will be found Geologically wanting, in some healthy factor or another, permitting the subsoil to be loaded with organic matter. Going to the head-quarters of Cholera, for instance, Calcutta, we shall see that the soil is of a very peculiar character, unfitted to yield good drinking water. Mr. Blanford describes it as a mixture of firm sand and clay, with decayed animal and vegetable matter, also loam, very much like the silt that settles from the water of a muddy river.

Following this, at a distance averaging eight feet, is a bed of stiff clay, and below this again is a layer of peat, resting on alternating layers of sand and clay.

The Hindoos, however ancient and learned a people, never understood Geology, or they would never have laid down the lines of a city on such a soil without at least draining it. Even in our own country, where we are bound to reside upon the clay, as in the case of overgrown London, it is unsafe to build upon our pure clays without covering the site of the house with a few inches of concrete.

Just one word upon clay, as there are clays and clays. The London, the Wealden, the Lias, Carboniferous, and Silurian clays all vary in composition and in density. There is one capital method of discovering whether a soil is a clay loam, a strong clay, or a pure clay. If 100 grains of the soil be treated, and leave from 40 to 70 grains of clay, it is a loamy soil, if from 70 to 85, it is a clay loam, if from 85 to 95, it is a strong clay soil, and when no sand can be separated it is a pure clay.

It would be impossible in the time allotted to me to do more than merely hint at some of the relationships between Geology and the causes of disorders. I will name a few promiscuously. Take, for instance, the effect of damp soils upon health. These soils are cold, and cause a mistiness in the air, inducing, when worst, catarrhs, rheumatism, and neuralgia. Moreover, the emanations which reach the surface are of an unhealthy organic character.

When active Geological changes ceased, when the earth became fit to receive life—and it is in the same condition at the present time as regards the height of its hills, the depth of its valleys, and the width of its river-beds—nature had always provided, with rare exceptions, for the removal of water to the nearest stream, and if this natural flow be impeded, in the case of wet soils, paroxysmal fever follows. An instance of this occurred at the making of the Ganges and Jumna canals, and many other similar cases could be related.

Drs. Parkes and de Chaumont have mentioned some of the soils which have been known to evolve the agent which produces periodical fevers in malarious districts. These are marshes, alluvial soils, soils of tropical valleys, sandy plains, certain granitic and metamorphic rocks, and iron soils. With reference to the last mentioned, Sir Ronald Martin has directed attention to the fact, that many reputed malarious soils contain a large proportion of iron. The direct association of the two deserves further examination.

The soil of the Roman Campagna, which so abounds with malaria, fever, and so on, is very shallow, and rests upon about

seven feet of that peculiar substance called tufa, and this again upon other volcanic materials. There is, therefore, no subsoil, and no chance of circulation for air or water. When the heavy rains fall the water rests on the bed of tufa, which is impervious, and generates the unhealthy mists prevalent there, which I have myself witnessed. When the drought comes, the soil is perfectly baked. Even if the soil itself were uncontaminated, acqua-malarial fevers would ensue.

It is very curious to note that, although Geology has produced such an insalubrious area, she has provided the cure for it. This the monks of La Trappe have discovered, *viz.*, by boring holes into the deposits of tufa, placing dynamite in them, and exploding this substance by electric conductors. In a very few days after these explosions, a good subsoil has been established at a small cost.

It would he impossible to give a list of the malaria and ague-producing sites and their peculiarities, in such a short paper, and I will only mention one, because I suffered from it myself. I foolishly slept outside the closed tent, somewhat nearer the Jordan than my friend, a London physician and the servants, and the result was, that I caught a peculiar fever, which took me three months residence in Alexandria to throw off sufficiently to enable me to travel. Portions of the plains of Troy, I know personally, are also active in producing ague; and it is comical to see what a quantity of quinine the herdsmen will put away when they get the chance, which is very rare.

It is well known that health is greatly effected by the kind of water prevailing in districts; and here again, there is an association between Health and Geology. Of the two waters, hard or soft, the soft one is purer. Water of considerable hardness may be drunk with impunity, but when the carbonate of lime, &c, from the Mountain Limestones, Chalks, &c, are very abundant—although they are the least injurious of the ingredients which make water hard—they exercise a certain prejudicial effect upon man and beast. Drs. Parkes and de Chaumont observe, that dyspepsia in the form of constipation or diarrœha follow the use of certain hard waters. Dr. Sutherland discovered that the hard water of the New Red Sandstone Rocks, formerly much used in Liverpool, also deranged the system, and, according to Dr. Leech, the substitution of soft water for hard water in Glasgow lessened derangements there. It is said that horses even, regularly using hard water, suffer from an abnormal growth of bone, and a spoiling of the skin. Calculi are also generally believed to be formed by drinking hard water, and cured by a substitution of soft water. There can be no doubt that the Geological features of a country

exercise considerable influence over the inhabitants who drink the water flowing from them. Mr. Grange has shewn that goître is a malady peculiar to districts where magnesian rocks exist, and that where consequently the water holds magnesia in solution. Drs. Parkes and de Chaumont have shown that certain drinking waters produce goître, and that when pure water is used the malady mostly disappears.

The characters of waters so variously affecting the health, depend entirely upon the Geological association of rocks, and it would not be a waste of time to take a hurried glance over the fields of hard and soft water-sheds in Great Britain.

Professor Ramsey points out that the waters of the Scotch rivers are soft, and especially the waters in the Highlands are soft, owing to the fact of the mountains being composed of granite, mica, &c, and the other rocks being also, with some exceptions, almost free from carbonate of lime. The waters from the Welsh mountains are chiefly from the Silurian rocks, containing little lime, and are, consequently, for the greater part, soft. The purest supply in our country is that derived from the primary rocks, which hedge in Lock Katrine, and which water now supplies Glasgow city. The waters of Bala Lake are also so pure, soft, and sweet, that it has been proposed to bring them to London. Waters which drain large areas of carboniferous limestone are always hard, and the same is true of the chalk formation, as well as of the Lias and Oolites which largely contain limestone. On the Old Red Sandstone areas containing limestones or cornstones, the water is likewise hard.

Waters drawn from alluvial ground are great in quantity, but the quality is very rarely commendable. My friend, Mr. Bristow, F.R.S., mentions a case near Bath, where large trees were found beneath an alluvial red loam. The presence of these soft, perished old world trees is not in favour of a well, and good water is never found in their vicinity. Great care should also be exercised when building over rocks with large fissures running through them.

One must notice the mineral waters, thermal or otherwise, with their strong medicinal powers, but I will be very brief. How they obtained their chemical constituents is a formidable enough question to answer, but a still more difficult one is how the hot mineral waters used for baths were produced, whether by chemical agency underground, by volcanic proximity, by internal heat of the earth, or by electrical changes. Natural hot waters have at all times been preferred to artificial waters for baths, and besides waters bubbling up from the earth, there are also the mud baths of Germany, mud rich in active agents, and used for baths and fomentations.

The mineral waters used for drinking purposes are equally valuable in disease and health, and the use of the sulphur, the saline and chalybeate waters are known to everyone. In Great Britain we lack only one class of mineral waters altogether, and that is the carbonated class which are so highly charged with carbonic acid. It is to be questioned whether the Geological conditions of the neighbourhood of the Spas, have not much to do with the benefit derived by their visitors, for there are more marked results when the waters or salts are used there, than when made use of at a distance.

Salt, which is the only mineral food of man, and which, in the shape of a condiment, forms the only replenishment to the blood, of the saline particles eliminated from it, in the bile and in tears, &c, it would be ungrateful not to give Geology the credit of. Salt can be obtained from sea water, but it is coarse compared with that of brine springs and rock salt. It is met with in rocks of every age, but chiefly in the New Red Sandstones, pebbly conglomorates, and in the variegated shales and marls.

Geology should also be credited with the conversion of those metallic elements which are used in medicine. Of the sixty-three known elements, says Dr. Attfield, thirty-nine are of medical or pharmaceutical interest, and of these about two-thirds are metals derived from the earth. In our pharmacopœia, one hundred and twenty-one different plants are used, but considerable use is made as well of the metals, iron, lead, zinc, antimony, and others. We need say nothing of the benefits derived by medicine from the sedimentary rocks, such as lime, chalk, fullers' earth, and a score of other things.

THE COMPULSORY NOTIFICATION OF INFECTIOUS DISEASE.

PAPER BY PROF. W. H. CORFIELD, M.A., M.D. (OXON.)

Ordinary Meeting, July 24th, 1883.

THE subject of "The Compulsory Notification of Infectious Disease" is one of so much importance, and one upon which there is such a large amount of controversy, that the Council of the Sanitary Institute thought it would be well to devote a meeting to the discussion of the subject, and asked me to prepare a paper to bring the matter forward.

To enable me to give the most practical information on the subject, I sent the following series of questions to the medical officer of health of each of the towns in which compulsory notification is in force, asking for particulars as to the working of the Act:—

Re COMPULSORY NOTIFICATION OF INFECTIOUS DISEASES.

1. Name of District?
2. Population Census, 1871? and 1881?
3. How long has the notification of infectious diseases been compulsory in your district?
4. What diseases are included under the Regulations?
5. Is the notification compulsory on the medical officer, or on the householder, or on both?
6. Is any fee, and, if so, what, paid for the notification, and to whom?
7. What are the penalties provided for failing to notify?
8. In how many cases have these penalties been enforced?
9. Has there been any opposition to the Regulations either before they were in force or since? If so, what was the nature of such opposition, and by whom was it made?
10. Are the medical men opposed to the Regulations, or do they heartily co-operate in carrying them out?
11. Have any cases of concealment of diseases, due in your opinion to the existence of the Regulations, come to your knowledge? If so, give a brief account of them.
12. How many cases of infectious diseases were notified to you on an average annually during the (say) 10 years before the Regulations came into force?
13. State also the number for each disease, and for each year separately if possible.
14. State the corresponding numbers for each year since the Regulations have been in force.
15. What was the average annual zymotic death rate for (say) 10 years before the Regulations were in force, and what has been the corresponding death rate since?
16. Are you of opinion that by means of the Regulations you have obtained (*a*) earlier information of the existence of cases of infectious diseases, (*b*) information of the existence of cases that would not otherwise have been reported to you?
17. Have the Regulations assisted you in tracing the origin of any outbreak of infectious disease?
18. State briefly your general opinion as to the results produced by the enforcement of the Regulations, and add any information that you think may assist the investigation.

To these questions I received replies from eighteen different towns, viz.:—

Birkenhead,	Huddersfield,	Stafford,
Blackburn,	Leicester,	Staleybridge,
Bolton,	Newcastle,	Warrington,
Bradford,	Norwich,	Aberdeen,
Chadderton,	Nottingham,	Dundee,
Derby,	Preston,	Edinburgh,

and it is chiefly to these replies that I propose to confine my remarks.

The answers to the principal questions have been tabulated, and are given at the end of this paper (p. 42).

The time that the Compulsory Act has been in force in the several towns varies from six months at Newcastle-upon-Tyne up to five years and six months at Bolton, and at Huddersfield partially for six and a half years, but only satisfactorily for two and a half years. In eleven of the towns the Act has been in force over two years, and in only two under one year.

The population of the eighteen towns, according to the census of 1881, varied from nearly 17,000 at Chadderton to 228,000 at Edinburgh, and amounted to over 100,000 in nine towns out of the eighteen. (See Table A.)

In the regulations in force in the different towns, twelve diseases altogether are mentioned (see Table B). Small-pox and scarlet fever are included in all the eighteen towns; diphtheria, typhus, and enteric fever in seventeen; cholera in fifteen; puerperal fever in eleven; relapsing fever in ten; measles and continued fever in four; whooping cough and erysipelas in two. The regulations therefore are chiefly confined to eight diseases.

In Birkenhead the Act provides for small-pox, fever, cholera, or "any other dangerous infectious disease." This the Health Committee interprets as small-pox, measles, scarlatina, diphtheria, fevers, and cholera.

At Bolton measles and continued fever were included at first, but not afterwards.

At Huddersfield the Act gives power to add other infectious diseases to the list.

At Nottingham the Act is only in force for one year as a trial, and the list includes only small-pox and scarlet fever.

At Dundee the list includes nine diseases (measles, whooping cough, and erysipelas being omitted), and there is also power to add "such other diseases as the Commission may declare to be infectious."

By reference to Table C., it will be seen that in eleven of the towns it is compulsory on both the medical attendant and householder to notify an outbreak of any of the diseases to which the Act applies in the particular town.

In six towns the medical officer only is compelled to do so.

In one town only, viz., Nottingham, it is compulsory on the householder alone, but the medical attendant has to give a certificate to the householder. In Bradford the notification is compulsory on both, but the medical attendant need only hand the certificate to the householder.

At Birkenhead it is compulsory on the householder, but as soon as he calls in a medical attendant the obligation to notify passes from the householder to the medical attendant.

It will therefore be seen that the notification is more generally compulsory on both the medical attendant and householder.

The fee paid to the medical attendant (see Table C.) is almost universally half-a-crown for each case notified.

In Newcastle and Dundee it is half-a-crown for private and one shilling for public cases. In Huddersfield it was formerly half-a-crown, but since the year 1880 it has been reduced to one shilling.

The penalties which may be inflicted for non-observance of the Act (see Table C.), vary in amount from forty shillings in seven of the towns, to £5 in six, and £10 in four other towns, while in Birkenhead the penalty is £5 for the first offence, and £10 for the second.

No penalties have been inflicted in ten out of the eighteen towns named(see Table C.). There are six cases in the following five towns in which medical attendants have incurred penalties of the amounts specified, viz.:—Blackburn, 10s. and costs; Bolton, £5 and costs, for not notifying a case of small-pox in a butcher's shop; Huddersfield, one case of 5s., and one of 10s.; Warrington, one case (amount not stated); and in Edinburgh there have been no cases for refusal to notify, but one for not reporting a case of "gastric fever" which the medical attendant thought was not included in the list, the amount of the penalty not being stated.

The following are the penalties which have been inflicted upon householders. At Bradford three cases, amounts nominal; Derby six cases, in four of which it does not state whether on householder or medical attendant; Huddersfield, four cases;

Stafford, two cases in neither of which is it stated whether on medical attendant or householder; and at Warrington, one case.

The penalties inflicted at Boston, Massachusetts, U.S.A., are much more severe, and the regulations much more stringent, than any proposed in this country, as will be seen from the following quotation from Mr. Francis Vacher's Paper on "Sanitation at Boston, U.S.A.":—

"When a disease dangerous to public health breaks out in any town the Board shall immediately provide a hospital or place of reception for the sick, and the Board may cause any sick and infected person to be removed thereto, unless his health would be endangered by such removal, in which case the house or place where he remains shall be considered as a hospital, and persons therein shall be subject to the regulations of the Board.

"The Selectmen and Board of Health shall use all possible care to prevent the spread of infection, and to give public notice of infectious places to travellers by displaying red flags at proper distances, and by all other means which in their judgment shall be most effectual for the common safety. Whoever obstructs the Selectmen, &c., or wilfully removes, defaces, or handles the red flags shall forfeit for each offence not less than 10 nor more than 100 dollars.

"When a householder knows that a person within his family is taken sick of small-pox or any other disease dangerous to the public health, he shall immediately give notice thereof to the Selectmen or Board of Health of the town in which he dwells; if he refuse or neglect he shall forfeit a sum not exceeding 100 dollars. When a physician knows that any person whom he is called to visit is infected with small-pox or any other disease dangerous to the public health, he shall immediately give notice thereof to the Selectmen or Board of Health of the town; and if he refuses or neglects to give such notice, he shall forfeit for each offence a sum not less than 50 nor more than 100 dollars."

There was a slight opposition to the Act in some instances at first (see Table D.), but this appears to have originated from want of knowledge, or undue apprehension of its effect, and in nearly all cases ceased when the Act was fully in operation.

In the majority of the towns, the medical men heartily co-operate to secure the beneficial working of the Act, although their opinion is to a slight extent divided in Blackburn, Bolton, Nottingham, and Preston, and in one town a practitioner opposes the Act, but of this gentleman it is stated that "he is eccentric in many other matters besides the one under consideration."

Before the regulations were in force there were very few

cases notified in any of the towns, and none whatever in most of the large towns. In Bradford, however, nearly all the small-pox cases, and a few others, were notified. In Aberdeen, between the years 1879 and the month of July, 1881, the Act was optional, the fee to the medical attendant being 2s. 6d. for each case reported; and the following numbers of cases were notified under this regulation: 1879, 1,536; 1880, 738; to 31st July, 1881, 836. Since the Act became compulsory, on August 1st, 1881, the following results have been obtained: August 1st to December 31st, 1881, 604; 1882, 3,093; to April, 1883, 466.

The medical officer says:—"It might be asked, Why not remain optional, since so many cases were reported? Well, it was found that it did not act well, for although the majority of practitioners were willing to report, a few who never did, reaped the benefit. The patients quarrelled with their medical men, threatened, and often changed to those whom they learned would not report the case. Now that the reporting is compulsory this source of irritation is allayed."

In Dundee the average number of cases reported before the regulations came in force was 421, and in the four years since then, the average has risen to 1,910.

The medical officer says:—"With regard to Dundee, you may take it as an absolute fact that the system of notification in force has from the first been carried out successfully without the slightest friction or strife between the sanitary authorities on the one hand and the public and medical practitioners on the other. The latter have shown the greatest good sense and good feeling themselves, notifying in every instance, and persuading their patients' friends to do likewise. As to the alleged dangers and harassing vexations attendant on this system of notification, I can only say that here we have had no experience of them. After carefully considering the whole evidence I am of opinion that the dangers have nowhere been proved of serious moment, and the vexations have been unduly magnified."

In Edinburgh, previous to the Act coming into force, not more than fifteen cases per annum were notified; but the numbers obtained since it has been in operation have increased from 386 during the two months, November and December, 1879, to 7,063 in the year 1882.

In Bolton no cases were notified previously, but the numbers recorded since vary from 469 to 1,939 per annum.

In Derby there was no notice of any case prior to the Act coming into force, but the numbers reported since range from 541 to 914 per annum.

In Leicester there were practically none notified before, but the cases recorded since are from 1,343 to 1,841 per annum.

In Norwich there were no cases reported previously, and those now notified have decreased from 853 to 165.

Cases of concealment (see Table D). The medical officers, in twelve out of the eighteen towns mentioned, report that no cases are known.

In Blackburn some cases of scarlet fever were not reported by the medical attendant; but there has been no concealment by any of the householders.

In Derby several supposed cases were reported, all of which, however, on investigation, turned out fallacious. The town clerk says:—"Instead of concealment being engendered by the operation of the Acts, on the part of the public, the contrary has been our experience here, as where it has been attempted the neighbours have always informed the sanitary authority of the case, looking to them for protection from their friends."*

In Huddersfield there have been two cases; in one of which the mother feared removal, and in the other the householder kept back the doctor's certificate and was fined. The medical officer of this town says: "From the freedom with which certificates come in, there cannot be much intentional concealment; practically it is not a difficulty."

In Nottingham the medical officer says: "None; in which I could say that the notification regulations had caused the concealment. *It must be remembered that concealment was very common before notification clauses were thought of.*"

In Staleybridge the medical officer says: "In one case only, said children had measles, to evade reporting it"—measles not being included in the regulations.

In Aberdeen there were some instances of concealment of cases of typhus and scarlet fever, where no doctor had been called in. The medical officer says:—"But as such like cases used to occur before there was compulsory notification, and are no more numerous than then, the regulations have not been the cause."

In Dundee, three alleged cases.

In Edinburgh, the medical officer says: "None; the citizens cheerfully co-operate in carrying out the provisions of the Act. I frequently receive letters from respectable citizens inquiring if cases of infectious disease in their families have been reported by the medical attendant."

In Leicester the town clerk says:—"As to what is urged by the medical profession as to medical men not being called in, it

* Liverpool Report on Notification of Infectious Diseases, p. 57.

is a theoretical misgiving which, if you are fortunate enough to secure the power, in practice will never be found to arise."*

In Blackpool the mayor says:—"Neither myself nor our medical officer know of a single case of concealment; as the town pays the cost of disinfecting, as well as for all clothing destroyed, where is the object of concealment."†

In Bradford the medical officer of health says:—"As to the allegation that people would conceal infectious disease, and not send for medical advice for fear of having the case reported, I can safely say that such has not been the case in this town. It is true that some cases of scarlet fever were not attended by medical men, but certainly not for the reason alleged. They were mild cases, and were supposed (very erroneously) to require but little care. The parents of three of these cases were prosecuted for not having notified them to the authorities. They pleaded, not that they were afraid of the consequences, but that they were ignorant of the necessity."‡

Reductions have taken place in the zymotic death-rate since the passing of the Act at Bolton, Bradford, Leicester, and Edinburgh (in the last case being very considerable, viz., from 15·31 to 12·18 per 1000). There has been a slight increase at Norwich, owing to an epidemic of scarlet fever in 1880, the year the Act came into force; also a slight increase at Staleybridge, not, however, due to diseases with which the Act is concerned, but caused chiefly by an epidemic of whooping cough.

In a letter from the medical officer of health, Birkenhead, published in the Liverpool Report, he says:—

"The extraordinary allegation that compulsory notification, in places where it exists, has increased the mortality from diseases required to be notified, is certainly not borne out by facts in Birkenhead, as the following figures will show":—

"The mortality from the diseases required to be notified was, during the first quarters of the four years, 1878–79–80–81, respectively 45, 28, 46, 36, giving an average of a little over 38; the mortality from the same diseases during the first quarter of 1882 was 19. The mortality from the diseases required to be notified was, during the second quarters of the four years, 1878–79–80–81, respectively 33, 37, 36, and 34, giving an average of 35; the mortality from the same diseases during the second quarter of 1882 was 16. Thus the mortality from diseases required to be notified has, since compulsory notification came into force in the Borough, so much decreased, that it has been

* Liverpool Report on Notification of Infectious Diseases, p. 5.
† Ibid., p. 16.
‡ Ibid., p. 20.

less than half the average of the corresponding mortality of recent years."*

The facts from the other towns are not sufficient to form any conclusions.

The unanimous opinion of the medical officers of health is that the regulations have been of great advantage in obtaining earlier information of the existence of cases of infectious diseases, and information as to cases that would not otherwise have been reported. Most of them also state that assistance has been obtained in tracing the origin of outbreaks of infectious disease (see Table E.). The following references to the subject are worth quoting.

From Blackburn the medical officer reports:—"It is next to impossible to compel the cotton mill operatives to thoroughly isolate in infectious cases."

At Bradford the medical officer says:—"The public strongly approve of the Act. Careless people seeing the great importance attached by the authorities to the proper treatment of infection have amended their ways, and take much more care than was formerly the case to prevent the spread of disease."

The medical officer of Chadderton says:—"The compulsory notification is of the very greatest value and ought to be quickly passed for the whole country."

The medical officer of Derby states:—"We should be lost without them. The majority of the Derby people would feel unsafe without their protection, and without the visitation by inspectors to see that proper precautions are taken."

At Norwich, the medical officer says:—"I have been able to obtain valuable information as to the sanitary state of infected localities and to remedy defects, also in many instances to effect isolation."

At Blackpool, the mayor says:—"With its aid we consider ourselves under normal conditions, perfect masters of the situation. Amongst other diseases imported into this town at the begining of this year was a case of smallpox, which our powers enabled us to stamp out at once, and I tremble to think of the ruinous consequences to a town of this character, which might have resulted under the old condition of things."†

From the facts that I have laid before you, I have been forced to the conclusion that "The Compulsory Notification of Infectious Disease" is a very important sanitary measure, and a great boon to the community to whom it has been applied.

There can be no doubt whatever that, in a vast number of

* Liverpool Report on Notification of Infectious Diseases, p. 34.
† Ibid., p. 15.

cases, information has been obtained of the existence of infectious disease which would never have been obtained at all, or, if obtained, would have come too late to be of much service.

Everyone who has had anything to do with the prevention of Epidemic Diseases, knows that the most important thing of all is to get the earliest information of the cases that arise; and that an epidemic may be checked and stamped out with comparative ease if it is taken in hand early enough, but that the difficulty increases every day that is lost.

The objection that cases of concealment are likely or even certain to occur where such Acts are in force, has been completely met by the quotations that I have made to you; but to my mind, this objection of which so much has been made, is so childish as to be almost ludicrous.

If there are cases of concealment every day where such an Act is in force, there are many times as many such cases where no Act is in force.

One would have thought that it must have been obvious to everyone, that in a town where a hundred cases are reported under the Act, while only ten were reported during the same time, *before* the Act was passed, there are at any rate, ninety cases reported under the Act which *would have been concealed without it.*

With regard to the vexed question as to whether the medical attendant or the householder, or both, should be compelled to notify the existence of cases of these diseases to the sanitary authority, the most general practice appears to be to make it compulsory upon both; but the evidence, as I understand it, shows that at any rate medical men should be required to give the information; and also that they should be required to give it *direct to the sanitary authority*, rather than to the householder.

This is a matter upon which I do not wish to insist strongly, but simply to give the impression that the results of the enquiries have left upon my mind.

I think that the evidence is very strong that in most places, at any rate, little or no difficulty has arisen from the medical men being compelled to give this information. As to the suggestion that these Acts, so far from diminishing the number of cases of infectious diseases, are likely to increase them, I would ask you do you think it likely that, without any exception, the medical officers of health of the towns where these Acts are in force, would support them strongly if *they* thought the number of cases of infectious diseases was going to be increased by them?

The business of the medical officer of health is to *prevent*

disease—especially such diseases as these—and he gains credit by doing this, and *not* by *increasing* them.

Do you suppose that these medical officers of health do not know their own business, or do you suppose that they have combined together to do that which must certainly bring discredit upon themselves?

I ask you on the contrary to believe that the medical officers of health of these towns know the way to prevent infectious diseases from spreading, and are doing their utmost to lead the medical profession and the public generally, up to the point of seeing the great need for the passing for the whole kingdom of such an Act as those which have been so beneficial where they have been applied. And I take this opportunity of thanking all those gentlemen for the trouble they have taken in answering the questions sent to them, and so enabling us to epitomise the evidence on the subject.

TABLE A.

Population and Date of Regulations.

NAME OF TOWN.	Population. 1871.	Population. 1881.	Date at which regulation came in force.	Number of Years in force. Years	Months
Birkenhead	65,971	84,006	Jan., 1882	1	3
Blackburn		104,034		3 or 4	
Bolton	82,853	105,414	Sept., 1877	5	6
Bradford	147,101	183,008	July, 1881	1	9
Chadderton	12,205	16,897	Aug., 1882		7
Derby	43,810?	81,171	Nov., 1879	3	5
Huddersfield	70,253	81,825	{Autm. 1876‖ ; 1880}	6 ; 2	6 ; 6
Leicester	95,220	122,376	Sept., 1879	2	6
Newcastle		145,228	Sept., 1882		6
Norwich	80,386	87,843	1880	2	6
Nottingham	86,000	186,000	Apr., 1882	1	
Preston	85,427	96,524	Oct., 1880	2	6
Stafford	15,437	19,977	1880	2	6
Staleybridge	21,092	22,784	Aug., 1881	1	7
Warrington	32,144	41,482	July, 1879	3	9
Aberdeen	88,181	105,076	Aug., 1881	1	6
Dundee	120,724	142,454	Dec., 1878	4	4
Edinburgh	196,979	228,346	Nov., 1879	3	5

TABLE B.

Diseases included in the Regulations.

TOWN OR DISTRICT.	Small Pox.	Measles.	Scarlet Fever & Scarlatina.	Diphtheria.	Whooping Cough.	Typhus Fever.	Relapsing Fever.	Typhoid and Enteric Fever.	Continued Fever.	Cholera.	Puerperal Fever.	Erysipelas.	Total.
Birkenhead	1	1	1	1	...	1	1	1	1	1	...	...	9
Blackburn	1	...	1	1	...	1	...	1	...	...	...	...	5
Bolton	1	1*	1	1	...	1	1	1	1*	1	1	...	8
Bradford	1	...	1	1	...	1	...	1	...	1	...	...	6
Chadderton	1	...	1	1	...	1	1	1	1	1	1	...	9
Derby	1	...	1	1	...	1	1	1	...	1	1	...	8
Huddersfield	1	...	1	1	...	1	1	1	...	1	1	...	8
Leicester	1	...	1	1	...	1	...	1	...	1	1	1	8
Newcastle	1	...	1	1	...	1	1	1	1	1	1	...	9
Norwich	1	...	1	1	...	1	1	1	...	1	...	...	7
Nottingham	1	...	1	...	...	...	...	...	...	...	...	...	‡2
Preston	1	1	1	1	1	1	...	1	...	...	1	1	9
Stafford	1	...	1	1	...	1	1	1	...	1	1	...	8
Staleybridge	1	...	1	1	...	1	...	1	...	1	1	...	7
Warrington	1	...	1	1	...	1	1	1	...	1	1	...	8
Aberdeen	1	1	1	1	1	1	...	1	...	1	...	...	8
Dundee	1	...	1	1	...	1	1	1	1	1	1	...	§9
Edinburgh	1	1	1	1	...	1	...	1	...	1	...	...	7
TOTAL	18	4	18	17	2	17	10	17	4	15	11	2	135

* These were included at first, but not afterwards. † With powers to add. ‡ These two only during period of trial. § And such other diseases as the Commission may declare to be infectious. ‖ The Regulations during this period were apparently so imperfect that they have not been included in Tables B. D. & E.

TABLE C.

Persons who are to notify. Fees, Penalties, and Inflictions.

TOWN.	Notification to be given by	Fees.	Penalties.	Inflictions.
Birkenhead	M.‡	2/6 to M.	£5 1st. £10 2nd	None.
Blackburn	M.	2/6, with interval.	£5.	One on M., 10/- & costs.
Bolton	M. & H.	2/6 to M.	£10.	One on M. £5 & costs.
Bradford	M. & H.*	2/6 to M.	£5.	Three on H., nominal.
Chadderton	M. & H.	2/6 to M.	40/-	None.
Derby	M. & H.	2/6 to M.	40/-	Six?
Huddersfield.	M. & H.	First 2/6, & then 1/- to M	£5.	Two‖ on M., 5/, & four‖ on H. [& 10/-
Leicester	M. & H.	2/6 to M.	£10.	None.
Newcastle	M. & H.	Private 2/6 Public 1/- to M.	40/-	None.
Norwich	M.	2/6 to M.	£5.	None.
Nottingham	H.†	2/6 to M.	£5.	None.
Preston	M.‡	2/6, with interval.	£10.	None.
Stafford	M. & H.	2/6 to M.	£5.	Two.
Staleybridge	M. & H.	2/6 to M.	40/-	None.
Warrington	M. & H.	2/6 to M.	£10.	One on M., one on H.
Aberdeen	M. alone	2/6 to M.	40/-	None.
Dundee	M. & H.	Pri. 2/6 to M. Pub. 1/- to M.	40/	None.
Edinburgh	M. alone	2/6 to M.	40/-	One on M. for omitting a disease included in the list.

TABLE D.

Opposition to Regulations and Concealment of Cases of Infectious Diseases.

TOWN.	Opposition.	Concealment of Cases in consequence of regulations.
Birkenhead	Yes, at first by M., but now ceased.	None known.
Blackburn	Yes, by three or four M.	Some not reported by M.
Bolton	Yes, by a small proportion of M.	None known.
Bradford	Not to notification, but to further powers.	None known.
Chadderton	None; notification voluntary before Act.	None known.
Derby	Yes, by one M.	None.
Huddersfield.	Opposition before but not after passing.	Two?
Leicester	Opposition before but not after passing.	None known
Newcastle	Opposition before but not after passing.	None known.
Norwich	None.	None known.
Nottingham	Yes.	Not more than before the regulations
Preston	Yes, by a few M.	None known.
Stafford	Very little.	None known.
Staleybridge	Very little.	One.
Warrington	Very little since passing	None known.
Aberdeen	None.	Not more than before the regulations.
Dundee	None.	Three.
Edinburgh	Opposition before but not after passing.	None known.

TABLE E.

Advantages of Regulations, and general opinion of the Medical Officer of Health on their working.

TOWN.	Advantages. Earlier information of the existence of cases of I. D.	Advantages. Information as to cases that would not have been reported.	Advantages. Assisted in tracing the origin of outbreaks of I. D.	General opinion of M.O.H.
Birkenhead	Yes.	Yes.	Yes.	Have certainly assisted the Sanitary Authority.
Blackburn	Yes, generally.	Yes.	*No*, except in epid. of S.P.	*Not much actual* benefit, except in S. P.
Bolton	Yes.	Certainly.	Yes.	Satisfactory, freedom from I. D. greater; death-rate reduced.
Bradford	Decidedly.	Certainly.	Yes.	Satisfactory.
Chadderton	Yes.	Yes.	Yes.	Results of the greatest value.
Derby	Decidedly.	Certainly.	Yes.	There can be no doubt of their utility.
Huddersfield.	Yes.	Yes.	Yes.	*Useless unless* energetically carried out.
Leicester	Yes.	Yes.	Yes, very much.	Very satisfactory.
Newcastle	Yes.	Yes.	Yes.	Of much advantage, but show the necessity of power to compel isolation
Norwich	Yes.		Yes.	Enabled me to obtain valuable information.
Nottingham	Yes.	Most certainly.	Yes, very decidedly.	The results are proved to be beyond doubt of great benefit to the public.
Preston	Most certainly.	Most certainly.	Most certainly.	Of great service in checking the spread of infection
Stafford	Certainly.	Certainly.	Most decidedly.	Most satisfactory.
Staleybridge	Yes, most certainly.	Yes.	No.	I believe great good in the end will come.
Warrington	Certainly.	Certainly.	Certainly.	
Aberdeen	Most undoubtedly.	Yes.	Yes.	Complete control over all the diseases.
Dundee	Undoubtdly.	Certainly.	Yes.	Of the greatest benefit to the Public Health.
Edinburgh	I have no doubt on the subject.		Yes.	Of great advantage in several ways.

M. = Medical Attendant. H. = Householder. * But the M. need only give Certificate to H. † But the M. is to give Certificate to H. ‡ Or on H. if there is no M.
‖ One of these on M., and one on H., were under the first Regulations.

CONGRESSES AND OFFICERS.

TABLE showing the places at which the Congresses of the Sanitary Institute of Great Britain have been held; with Presidents, Presidents of Sections, and Honorary Local Secretaries and Treasurers.

Presidents.	Presidents of Sections.	Honorary Local Secretaries & Treasurers.
1877. B. W. RICHARDSON, M.D., LL.D., F.R.S., Leamington, October.	EDWIN CHADWICK, C.B. GEORGE WILSON, M.A., M.D., F.C.S. BRUDENELL CARTER, F.R.C.S.	J. THOMPSON, M.D. JOSEPH S. BALY, F.C.S. T. H. THORNE, J.P.
1878.—EDWIN CHADWICK, C.B., Stafford, October.	B. W. RICHARDSON, M.D., LL.D., F.R.S. HENRY DAY, M.D., F.R.C.S.	W. ELLIS CLENDINNEN. H. B. LIVINGSTON. THOMAS WOOD.
1879—B. W. RICHARDSON, M.D., LL.D., F.R.S., Croydon, October.	ALFRED CARPENTER, M.D., M.R.C.P.LOND., C.S.S. CAMB. CAPTAIN DOUGLAS GALTON, R.E., C.B., D.C.L., F.R.S. G. J. SYMONS, F.R.S.	H. J. STRONG, M.D. ROBERT HALL. SAMUEL LEE RYMER.
1880.—The Right Hon. EARL FORTESCUE, Exeter, September.	PROF. DE CHAUMONT, M.D., F.R.S. R. RAWLINSON, C.E., C.B. SIR ANTONIO BRADY.	E. J. DOMVILLE, M.R.C.S.E. H. P. BOULNOIS, M.INST.C.E. W. G. ROGERS.
1882.—CAPT. DOUGLAS GALTON, R.E., C.B., D.C.L., F.R.S., Newcastle-upon-Tyne, September.	DENNIS EMBLETON, M.D., F.R.C.S. H. LAW, M.INST.C.E. ARTHUR MITCHELL, M.A., M.D., LL.D., F.R.S.	W. G. ARMSTRONG, M.R.C.S. J. H. AMOS.
1883.—Prof. G. M. HUMPHRY, M.D., F.R.S., Glasgow, September.	PROF. W. T. GAIRDNER, M.D., LL.D. PROF. T. ROGER SMITH, F.R.I.B.A. R. ANGUS SMITH, PH.D., F.C.S.	J. B. RUSSELL, M.D. JAMES SELLARS, I.A. HENRY JOHNSTON.

The next Congress of the Institute will be held at Dublin, September 30th to October 4th, 1884.

CONGRESS AT GLASGOW.

SEPTEMBER, 1883.

PAPERS AND DISCUSSIONS.

INTRODUCTION.

By invitation from the Lord Provost and Town Council, seconded by an influential representative meeting in the City, the Sixth Congress of the Institute was held at Glasgow, from September 25th to 29th, 1883. The various meetings and lectures in connection with the Congress were held in the St. Andrew's Halls, in Granville Street, the accommodation in the building being well suited for the purposes, and the reception room and offices were also provided in the same building.

The papers submitted to the Congress were divided as usual in three Sections.

Professor G. M. Humphry, M.D., F.R.S., delivered the Inaugural Address on Tuesday evening, Captain Douglas Galton, R.E., C.B., F.R.S., President of the last Congress, taking the Chair, and formally installing Professor Humphry as Chairman of the Congress at Glasgow.

Dr. B. W. Richardson, F.R.S., delivered the lecture to the Congress on Thursday evening, and Dr. Alfred Carpenter delivered an Address to a very large audience of the working classes on Saturday evening.

The papers read at the Congress were divided into the following Sections:—

Section I.—Sanitary Science and Preventive Medicine, presided over by Professor W. T. Gairdner, M.D., LL.D. Section II.—Engineering and Architecture, presided over by Professor T. Roger Smith, F.R.I.B.A. Section III.—Chemistry, Meteorology, and Geology, presided over by R. Angus Smith, PH.D., F.R.S. One day was devoted to each of these Sectional Meetings, thus occupying Wednesday, Thursday and Friday.

A Public Luncheon was held on Tuesday afternoon, at which the Lord Provost presided, and welcomed the Institute in the name of the Town.

On Wednesday evening a Conversazione was given by the Town Council, and was very largely attended.

A Public Dinner was held on Friday evening at the close of the Business Meetings of the Congress.

An Excursion down the Clyde and round the Kyles of Bute was arranged by the Local Committee for the Saturday.

Very suitable buildings for the Exhibition, which was open from September 25th to October 20th, were provided in the Burnbank Drill Hall, Great Western Road.

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

Owing to some local difficulties Cheltenham is unable to receive the Institute in 1884, as previously arranged; the Council, therefore, accepted a very largely-supported invitation from the leading societies and from the prominent and influential residents in Dublin to hold the Congress in that city.

E. WHITE WALLIS,
Secretary.

April, 1884.

Officers of the Glasgow Congress.

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INAUGURAL ADDRESS

BY PROFESSOR G. M. HUMPHRY, M.D., F.R.S.,

PRESIDENT OF THE CONGRESS.

OUR presence here this evening, by invitation from the Lord Provost and Town Council of Glasgow, for which I beg leave to return hearty thanks on behalf of the Institute, is an evidence that the importance of the work in which we are engaged is recognised in this great focus of commercial and engineering activity, and may, I hope, also be regarded as an indication that the manner in which we do our work is regarded as satisfactory.

The importance of the work can scarcely be over-estimated; and, without fear of acquiring the attribute of egotistical assumption, we may safely assert that of all the many Congresses taking place at this time of year there is none in which the subject matter is of more vital interest to the community than that of the Sanitary Institute. This indeed might be stated if our work could be regarded as ministering to the improvement of the physical condition only of man with all the greater amount of comfort and happiness attendant thereon. But when we bear in mind the close connection between the mental, the moral, and the physical, and reflect that the mental and the moral qualities are to a large extent the outcome of the physical, and vary with it, and that therefore a deterioration or an improvement of it are necessarily associated with a deterioration or an improvement of them, then the value of sanitary work assumes vastly greater proportion and we learn more fully to appreciate the feeling which, even in long past ages, esteemed the laws that relate to the sanitary condition of a people as supreme.

So close indeed, further, is the interdependence of the physical, the mental, and the moral in man that an improvement or a deterioration in any one is certain to be attended by an

improvement or a deterioration in the other two. If, from indifferent sanitary arrangements or other cause, the physical be allowed to sink, the mental and the moral forces, which as just stated are dependent upon it, must soon be weakened. So also good sound education and that mental training which gives strength to thought and judgment, and which can only be carried out in the healthful body, will react beneficially upon the body as well as upon the moral tone, and will add to that uprightness and honour and that vigorous bearing which make the man. Still more true is it that moral delinquency ravages both body and mind, throws its dark shadow over coming generations, and infallibly leads to the degradation of the species. It does this, mainly, by its direct and indirect influence upon the body, by the infecting stain there which, like that upon the character, lurks and leavens the whole and bears on the father's sin to distant generations—"out, damned spot! out, I say." "Who would have thought the old man to have so much blood in him." "All the perfumes of Arabia will not sweeten this little hand. Oh! oh! oh!" Now what is so important, and what we want our legislators to feel, especially at the present particular juncture, is this, that in proportion as this stain is allowed to exist and to propagate itself and, by its hydra-headed maladies, to damage the bodies and lower the physical status of the people, so much the greater will be the deterioration of character and the tendency to moral obliquities of various kinds. This is one, and a potent one, among the ways in which vice sows the seed of future noxious weeds and fertilizes the soil for their growth. The moral delinquencies damage the body; and the so damaged body is the more prone to the moral delinquencies. The action and reaction is direct and swift. One way, therefore, to limit and arrest moral disease and to increase the healthy moral tone of a community is to limit and arrest bodily disease and to labour in every possible manner to improve the sanitary condition of the body. No sentimental fancies, no overdrawn apprehensions of interference with the liberties and rights and free action of citizens should be allowed to hinder the enforcement of those principles and laws which are requisite for the prevention and mitigation of disease, whether they be in the form of factory acts, of educational codes, of contagious diseases acts, or of provisions for the careful and humane conduct of experimentation upon animals. Let the *salus populi*, simply and sensibly and at the same time scientifically considered, be really and practically the *suprema lex*. Thus shall we best promote strength of mind, with attendant wise judgment and discretion, as well as sound morality, with attendant high-mindness and honourable feeling, in our people.

How largely does experience show us that the body is not merely the inlet to the mental and the moral chambers and the agent of the forces emanating thence, but that it is also, and to some extent consequentially, the type of them? How much, that is to say, of them can be inferred from it? What do we not learn of the largeness and strength and vigour of them from the corresponding evidences in it? How rarely is a strong and vigorous mind associated with a feeble and inert body? What kind of character do we judge to be the accompaniment of the upright frame, the open face, and the straightforward step? I admit that there are many exceptions. It must be that the complex machinery that makes up the mental, the moral, and the physical fabric of man is liable to many variations which warn us against too hasty judgment in individual cases. But let the many exceptions *probe* or try, not as often wrongly said *prove*, the rule. Perhaps nowhere is the rule more markedly evinced than in this northern part of our Island in which we now find ourselves. My remarks, let it be observed, have relation to peoples; and I always feel, what I think is by many admitted, that the Scotch are the finest people on the earth's surface, that the grandest combination of the physical, the mental, and the moral is produced here, the sturdiest, halest bodies with the largest brains, the strongest minds and the best morale—the qualities best calculated to thrive in every quarter of the globe. I always maintain that the quality, and it is a good one, of the English breed is not a little due to the flow of northern blood which, happily in a steady stream, is drawn southward by our somewhat more genial clime and by the other attractions associated with it. Long may Scotland thus prove England's best friend by being a prolific father and a nursing mother of her people and by contributing its annual quota towards the maintenance of her stalwart, upright, talented race.

By this providential, or natural, law of the association of the physical with the other qualities is worked out the predominance of the best. In the great struggles of nations the best win because goodness is the associate of strength and healthfulness; and the maintenance of the sanitary condition of a people is a necessity to the maintenance of a high position among others. This becomes yearly more and more the case as increasing civilization makes us increasingly dependent upon sanitary regulations and determines more clearly what those regulations should be. It is thus that civilization meets and counteracts her own evils. The clustering of peoples in masses together promotes, in various ways, the liability to disease, while growing intelligence and advancing science point out the means of preventing and arresting it; and as prevention is better than cure, so the

science which promotes the former is better than that which attempts the latter. To this the members of my profession are fully alive and willingly assent; and though their pecuniary gains are won by their efforts to cure disease, it is their constant and unselfish aim to trace out and stamp out the sources of disease; and it is their desire and practice to take an active part in every movement which has for its object the improvement of the sanitary condition of our people. Well will it be for our country when increased opportunity is given to them, in Parliament and out of Parliament, of making a deeper impression on the convictions of the country. One result, that we might anticipate from such an influence, would ere long be the institution of a Sanitary Department in our legislature, distinct from the Local Government Board, and under the direction of a Minister of Sanitary affairs, and I can scarcely conceive anything more likely than this to promote the well-being of our people and their success in everything they undertake whether it be literary, scientific, commercial or military. Such an office extending its administration to the sanitary condition of cattle would do much to reinstate the interests of agriculture, and to reduce the price and improve the quality of animal food; and it would find a further scope for action in considering and checking the diseases to which our various food-producing plants become more liable as they are more highly cultivated; and which, in many parts of the globe, are producing great devastation and pecuniary loss with accompanying distress and injury to the peoples. Under such a Sanitary office the department of the Registrar-General would properly be placed; the Ordnance and Geological Surveys and the Meteorological Office should be in connection with it; and this Institute would be a valuable handmaid in carrying on that which is perhaps its most important work, the conducting the examination of Surveyors and Inspectors. The greater extension of this work is sorely needed. A certain amount of suitable education, tested by examination, should be required of all candidates for these responsible offices; and it is obvious that a satisfactory fulfilment of the duties of surveyors and inspectors, and a respect for their opinions cannot be expected unless there is some security for the possession by them of a knowledge of the elements of sanitary science. The University of Cambridge has undertaken, and for some years carried on, an examination of medical men for certificates in sanitary science. Such certificates should be a necessary qualification for medical officers of health; and a subject of so great scientific interest, demanding so wide a range of knowledge, and fraught with such far-reaching benefits to mankind, ought certainly to be

included in the area of University teaching. The funds at the disposal of the University of Cambridge are not at present sufficient to accomplish this, or likely to be so for some time; and I do not know that a wiser and more beneficent direction could be given to the liberal aspirations of those who are indebted for ample means to the bone and sinew of the people than the foundation of a Professorship of Sanitary Science in the University, so giving the subject a definite place in the studies at that ancient seat of learning.

Among other benefits which would be likely to follow the formation of a separate governmental department, giving its full and undivided attention to sanitary matters, is the re-distribution and greater equalisation of the sanitary districts, together with a provision for their harmonious co-operation—the bringing, that is, of all into closer relation with one another and with the central department, so that the events which are taking place in one district might be speedily communicated, telegraphed if necessary, to others, and timely preventive measures against the spread, or transmission, of disease be taken.

Moreover, the higher and more definite relation with the Government of a separate sanitary department would tend to promote that official sympathy which is now much wanting, and would encourage a proper attention to, and recognition of, the services of those men who devote their time and abilities to sanitary science. It also would lead to a due consideration by Parliament of the pressing sanitary needs of the people: matters of far more importance to the nation than "agricultural holdings," "criminal procedures," and the greater number of those subjects upon which so much of the preceding sessions have been spent.

Good sanitary legislation must ere long be recognised as one of the first necessities for a prosperous people; and the Government of England ought not to lag behind, as it has a tendency to do, in its efforts to provide this great boon for the nation. It should take more active cognisance of the fact that a people must be preserved from the effects of their own imprudence; and it should not leave the carrying out of hygienic works, so much as it does, to parochial administrations and local authorities. It should be borne in mind that to be great a people must be healthy and vigorous, and that one of the causes to which the fall of the Roman empire has been attributed is "the pestilences which swept off the adult male population, and left the then proud mistress of the world an easy prey to the barbarians."*

The Government of the United States has shown its con-

* *Essays*, "*Public Health*," p. 5.

sciousness of responsibility to take action in this direction by a resolution of Congress, introduced at the suggestion of the National Board of Health, requesting the President to call an International Sanitary Conference, with a view to consider and improve the condition of the ports under the jurisdiction of the several Powers, as well as of the vessels departing from them. That Congress was well attended by delegates from Europe and other parts; several questions were seriously and carefully discussed, and important propositions were made. What is perhaps even more to the point, each one of the United States, with few exceptions, has its "State Entomologist;" and they all publish full annual reports upon the damage done to food-plants by various insects, and suggest means of prevention. Why should not something of that sort be done here? In most of the European States there is some recognition of duty in this respect; and much has been done in England through the Board of Health, the Local Government Board, and various legislative enactments. Still there is ample room for England to concentrate and improve her national sanitary organisation in such a manner that it may be an example to others.

Above all, in the case of the Army, and also of the Navy, it is a most urgent need that the sanitary service should be rendered more efficient, and placed upon a definite footing as a separate part of the medical staff, so that it has its distinct training, duties, responsibilities and powers. This cannot be too strongly impressed upon the authorities at the War Office and the Admiralty. It is not too much to say that next in importance to good generalship, for the success of a campaign, is good sanitary arrangement. Of what use are the best soldiers unless they are well handled and kept in good health. The prevalence of disease brings not only fatality but dispiriting and disorganisation. The massing together of troops in any place is certain, after a short time, to be productive of disease, unless the precautions taken against it are most careful and most rigid; and sad experience tells that the ranks of a stationary army are liable to be quickly decimated. To this are to be added the contingencies of climate, exposure, sudden variations in marches and in food, and the many liabilities of a soldier's life, to say nothing of the inflictions of a soldier's dress and accoutrements. Still, it ought not to be said that in our provisions against these sources of malady we are inferior to the Roman generals and the great captain of the Macedonian army, who owed their successes, not a little, to the endeavours they made to keep their soldiers in good health; and the records indicating an amount of unhealthiness in the British armies, exceeding that of the French and some others, ought to stimulate to some change in our arrangements. It has been computed

that in ordinary warfare the victims of disease are three times as many as those of the sword, with which, I take it, are included the fearful adjuncts to that weapon made by modern science. This startling announcement ought surely to arouse the attention and stimulate the efforts of the authorities. Yet it appears that little advance has been made since the disastrous period of the Crimea. It is appalling to contemplate what would probably have been the consequences of a prolonged campaign in Egypt. The one thing we have to regret in the easy victory of Tel-el-Kebir, with the consequent quick termination of hostilities, is the prolongation of indifference as to sanitary precautions, and the postponement of the lesson we should there have had, till, possibly, some severer penalty compels a reform. Why should we wait for disaster to enforce the dictates of reason and common sense? The insufficiency of the provisions for the medical-staff in Egypt, of which we heard so much—I do not mean of the medical-staff itself, but of the provisions for its operations—are bad enough; but the want of a thorough sanitary organisation, under the direction of well instructed and able men, is a far graver source of danger. Upon the lowest ground, as a mere matter of economy, this subject demands serious and urgent attention. The brave British soldier and sailor, bound and willing to face the battle and the breeze, are costly as well as valuable articles, and ought not to be at the risk of exposures to sources of disease, which science and wisdom would have foreseen and provided against. Squander money on big guns and other destructives of the foe, if you please, but grudge not the means requisite for the preservation of the men on whom you rely to fight your cause. What is more sad than to see our fine soldiers quit our shores, and feel that there is no adequate provision against their pining and wasting on a foreign soil without perhaps ever having the opportunity of seeking reputation at the cannon's mouth?

Under the most favourable circumstances, and in spite of the good influence of drill and discipline upon the physical and mental qualities of the men, a standing army is, to some extent, necessarily a deteriorator of national physique, inasmuch as by the selecting influence of recruiting regulations the best specimens are withdrawn from the community just when they are entering upon the vigorous period of manhood; and they are subjected to a high rate of mortality, from the peculiarities of their barrack-life, as well from exposures of various kinds to which I have alluded. The augmentation of an army, therefore, directly debilitates a nation and lessens its fighting power by the drain it makes upon the best bone and blood of the land. This is fully as serious, as the drain which it

makes upon gold, even if we take into account the diminution of gold-producing power consequent on the abstraction from the labour market of so many men in the prime of life; and it is less easily repaired. Every effort, therefore, should be made to reduce the drain to the minimum by the adoption of those precautions which sanitary science and experience show to be most calculated to prolong life and give health to the soldier.

Let our Institute play its part in upholding the British name by not resting till proper measures have been taken to render the sanitary staff a more organised, efficient, independent, and potent factor in the British army and navy—one which may exert its influence in peace as well as in war, in our foreign stations as well as at home, and which may make itself acquainted, as far as possible, with the sanitary conditions of various parts of the world in regard to military occupation.

The honourable and responsible task of presiding in this Congress and addressing you this evening has been assigned to me, I conceive, because the greater part of my life has been spent in the active duties of the medical profession and, therefore, necessarily, in an observation of the causes which lead to disease and early death, as well as of those which prevent the full development of the human body. On that ground alone can I venture to take my stand in addressing you. I cannot think of vying with our former Presidents who have devoted so much attention and ability to sanitary science—with Dr. Richardson, Lord Fortescue, and Captain Galton, and with him who, after fifty years of continuous labour in this direction, may pass on into his rest with the comforting assurance that he has saved more lives and done more to promote the physical and moral welfare of his countrymen than any man of our generation. I need scarcely say that I mean Edwin Chadwick. The exhaustive and admirable address given at Newcastle by the learned officer in whose steps I am called upon to tread, may well suffice for a couple of years. I have neither the time nor the ability for such a work; and I trust you will allow the mantle of its excellence to cover the deficiencies of this more humble effort.

The brief remaining time at our disposal will probably be turned to best account if I content myself by dwelling upon some of those points and thoughts which professional experience has impressed upon me; and I will take, first, and chiefly, those which relate to early life, forasmuch as they are the most important.

Small matters have often great import, especially at the

beginning of life; and this may be truly said of those mischievous two yards of calico or flannel which, wound round the middle of so many infants on their introduction into the world, as a sort of baptism to the numerous evils of fashion in dress to which they are admitted, constrict and hinder the expansion of that very region of the body where heart and lungs, stomach and liver, organs of no mean importance, are struggling for room to grow and do their work, and where natural mechanical conditions throw some difficulty in the way of full development. The expansion of the lower part of the chest, which is so pronounced a feature in the well-formed human figure, is attained chiefly in the higher animals, and, like most of such higher prerogatives, is the result of more than ordinary effort, and is, proportionately, liable to suffer from interference. The chief effort to accomplish it is made, soon after birth, when breathing and food-taking, and the various changes incidental upon them begin; and at this very juncture the opportunity is taken by meddlesome hands to hinder the expansion of the region where these new processes, upon which the well-being of the whole fabric depends, have to be initiated and carried out. A more pernicious device can scarcely be conceived than this relic of antiquated nursedom; and it is impossible to estimate the number of deformed, or pigeon-chests, of hampered stomachs, livers, lungs, and hearts, with their varied attendant life-enduring infirmities, and curtailment of life, that must result from the use of these "swathers," as they are called, for which there is not the slightest necessity. The oft-condemned tight waist-banding, and lacing of after years, which affects only the small fashionable section of one-half of the community, is not, even in those who are subjected to it, so mischievous as this concealed semi-strangling process which is diligently carried out in the case of a large proportion of infants of all classes. Of the three demands of the infantile period—liberty of movement, fresh air, and good food—it seems strange that the first two should be limited by smothering bed-clothes, swathers, long petticoats, and other dress-devices, together with imperfect ventilation of rooms, while the last is liable to be supplied sometimes in insufficient quantity and bad quality, but often, whether good or bad, in superabundance. How many poor helpless children are condemned into spasms, diarrhœa, convulsions, and death, which are complacently attributed to teething, that never failing cover for the multitude of the sins of the feeder. No other infant has, altogether, so bad a time of it as the human. None pays such penalties to the caprices, the fancies, the theories, and, above all, the immoralities of its parents.

A host of maladies, with a corresponding death-rate, are ignorantly regarded as its rightful heritage; and, as a sort of excuse for this many headed monster in the form of maltreatment, it is urged that, after all, the effect is that the weak are weeded out while the stronger survive, so as to result in the production of a healthier average manhood, and the maintainance of a finer stock. It is said that if, by better sanitary arrangements, we keep alive the weaker members, the effect will be that the physical status of the whole family will be lowered. A little consideration will, however, show that this is not only an inhuman but also a partial view; and we shall find here no exception to the rule that that which is most right is most politic. The same better methods which preserve some in life who would otherwise have passed out of it give better condition to all those who survive. All are, as it were, raised a step on the physical ladder, and the status of the whole is improved.

The mention of one part of the human frame which labours under developmental difficulties, and which is sorely hindered by impediments, reminds of another part which is even worse circumstanced. The well-formed human foot may be regarded as nature's last and hardest, and not least beautiful, work. It is the most characteristic feature of the human body, that to which man owes his erectness and firmness of gait and his ability to use the hand as the minister of his will. Even under favourable circumstances it attains perfection only in the higher groups of the human family; and in them it fails to do so more often than any other part of the body. The compact well-formed arch, the slightly spreading and gracefully curving supple toes, which give firmness together with spring and elasticity to the step, are comparatively rarely attained; and what atrocious impediments are thrown in the way of their acquiring and maintaining their proper form! The foot confers, as I have said, much upon the hand, and ill deserves the return made to it. How pretty is the infant foot, graceful in outline, supple, free, and varied in its movements. It has the hard task before it of being the unaided weight-bearer and propeller of the body reared erect and at right angles upon it; a task which it alone in the animal world attempts, and for which an exquisite mechanism is required and provided. Accordingly, it is forthwith hindered in its proper growth, crippled, deformed, stunted and weakened by bad-fitting unyielding cases constructed with an ill-advised view to economy or in accordance with a bad and meretricious taste. Never has this been more exemplified than in the odious combination of high heel and compressed pointed toe which transforms beauty to ugliness, curtails the play of the foot, shortens the step and spoils the

gait. We regard the Chinese foot as the *ne plus ultra* of barbarism in fashion, and we think of it with wonder and horror. But, be it remembered, that foot is not intended to do work. It is unfitted for duty and it is relieved from it. The Chinese lady is not to be subjected, like common folk, to the undignified trouble of walking about; and her feet are therefore superfluous. The Chinese must regard our fashion as even more absurd which cramps the feet and yet expects them to do their work, which takes away the straw and yet requires the tale of bricks. Still fashion will have its sway, and will bring its penalties in flat feet, crooked toes, and corns; and these, besides the direct suffering and trouble they induce, by interfering with natural exercise and movement, weaken the whole body, and lead to a variety of secondary ailments. Indeed, swathers and tight shoes may well be regarded as among the insidious and fertile sources of disease, and therefore worthy of the consideration of a Sanitary Congress.

Peculiarly is it the case in this island with regard to the foot. For if I mistake not, our countrymen, well cared for by nature in this respect, are, with regard to it, the greatest offenders against nature; and these offences in the matter of the foot are among the most prejudicial of their kind. The tattooings and the nose and lip-borings of various Indian tribes, and the head-flattening of others, which we stigmatise as barbarous, are not so damaging as the foot-spoiling so common among ourselves, and especially among our agricultural poor. The straight firm great toe, the high plantar arch, the well developed calf—three specialities of man, without which he cannot walk and run as he ought to do—are too commonly made, during childhood, to degenerate into the obliquely slanting toe, the flat foot and the puny calf, and the hobbling hesitating gait is substituted for the firm bold step. We must proportionately suffer in the race of life, and shall infallibly find out the disadvantage to our cost, whenever we come to be matched in the military march against a better shod and therefore better footed people.

To pass on to another subject which greatly concerns the well-being of the young, and therefore of the whole community, and which does so more especially at the present time, when it is being extended to the masses of our population, viz, Education. Will this extension advance the sanitary and moral condition of the people and therefore prove a boon to them, or will it not? This is a serious question; and the answer to it depends upon the quality and quantity of the education given. Education which strengthens as well as informs the mind, which increases the powers of reasoning as well as provides the material upon which to reason, will, we may be certain, improve

the physical as well as give tone to the moral qualities of man. All experience proves this. Knowledge, con-joined with the power to wield it, brings all nature under our sway. It not only reveals to us the best paths to health and strength of mind and body, but it also enables us to follow them. Sanitarians are therefore necessarily educationists; and their work is to ascertain and point out the kind of education which will be thus improving, to show that all which passes under the name of education does not deserve the name, that much, indeed, which is so called is calculated to produce the very opposite effects to those which are intended, being likely to lower instead of elevate the mental and moral standard. This it assuredly will do if it is so conducted or so pressed, as in any degree to weaken or damage the physical status.

It is for us to point out and strongly impress upon those who are engaged in education, that that education, and that only, is good which stores the mind without injuring the body. We cannot too often, or too forcibly, reiterate the statement that the mental and moral qualities are largely dependent upon the physical, and will rise or fall with it, and especially in these days, when, in the growing struggle for existence, teachers are being ranged against teachers, and pupils against pupils, in competition for certificates, prizes, and places. The temptation to over-strain, and be over-strained, is great; and the ill results upon mind and body are becoming more and more apparent. Every mental effort is attended by brain-wear. The greater and more prolonged the effort the greater the wear; and, unless sufficient time be allowed for repair, exhaustion ensues, and the brain is rendered less capable of renewed effort. Let it be remembered, especially, that this is true of attention. The teacher is apt to think attention an easy matter, and to punish quickly for inattention, whereas in reality it is almost the whole matter. It is the concentration of the mental batteries under the influence of the will. To effect it well requires a considerable effort of the will, which can be maintained, in children especially, only for a short time—for a few minutes in little children; and the attempt to enforce it longer, if unfortunately successful, leads to exhaustion of the power to make the effort, in short, creates inattention, and the frequent repetition of the process renders the inattention habitual. The more intense the effort at attention the more true is this. Yet the cultivation of the habit of quick fixed attention, which implies the restraint of wandering thought, constitutes the most essential feature of good education. Upon it briskness of apprehension, memory and mental power, in great measure, depend. It may indeed be regarded as the corner stone of the intellectual

building. We may endeavour to pile up any amount of material; but unless it is laid upon this foundation it will prove a crumbling and useless heap. Good bodily vigour is necessary for it. When weak, languid, or tired we cannot apply our minds effectively, that is, we cannot closely attend to anything; and we have greatest difficulty in doing so with regard to the subjects which interest us least.

Much has been written, by Chadwick and others, on the evil done by the length of time during which children are kept in schools and expected to bend their minds to subjects which, uninteresting in their nature, are rendered still more so by the manner in which they are taught; and of the truth of the allegation there can be little doubt. It is, on the face of it, absurd, or worse than absurd, that children should be pent up in ill-ventilated rooms for the space of two and a half or three hours at a stretch over dull lessons. Such treatment necessarily prevents the acquisition of the habit of attention, induces idleness, carelessness, apathy, and dulness, enervates both body and mind, and brings large numbers to the condition of having learned one thing only thoroughly, and that is to hate learning. Better results may be expected from an extension of the "half-time system," and the employment of the hours wrested from books in mechanical preparation for various trades, in military exercises, athletics, and so forth, as well as in acquiring some knowledge of music, of plants, of the habits of animals, and other subjects which will excite interest, command observation, and add pleasure to life.

Much has also been written, and with a good deal of truth, on the evils resulting from the high-pressure system in education, which is deemed requisite to prepare students for examinations, and to enable them to contend for the many prizes offered for competition at an early period of life. The stimulus of gain and ambition is resorted to, to counteract the dislike of learning, to which I have referred, and leads, no doubt, in many instances, to further evils.

In this age of increasing nervousness, which means susceptibility to impressions or sensibility, the effects of overtension, or overstrain, of the nervous system are peculiarly to be dreaded. They are very insidious, often attributed to laziness, are slow to be recovered from, and are a very frequent cause of break-down in the student's career. Many, from this cause, fail to reach the examination goal. Many, having reached it, had better never have sought it. Some require long periods of repose to regain the elasticity which heavy pressure has weakened, and to refit them for further work. Some never do regain it, and live on to disappoint the hopes which early dis-

tinction had raised. It has been my lot to watch many instances of these results, and, I hope, in many cases, to prevent them by strong remonstrances against the seducing but enervating *nocturna lucerna*, and by urgent advice to transfer some hours from work to rest and play, and by instilling the most wholesome maxim: *otiare quo labores*. Happily the play-ground and the river come more and more to the fore as the compensations for the schoolroom and the examination-hall; and the ambitions of parents are set almost as much upon successes in the former as in the latter. Their instincts tell them, rightly, that it is not by learned feebleness that the race of life is to be won, that the strong, well-knit, and elastic frame is best to be trusted as the home and agent of the sound and effective mind. As I have watched with interest the quickly-growing tendency to increased education of women, and the desire in women to match themselves in the mental arena against men, together with the rise and successful progress of Girton and Newnham Colleges, in connection with my own University, it has not been without apprehension that the associated strain and excitement might act prejudicially upon the sensitive fabric and the finely-strung nerves of the woman. I could not but feel that the consequences to her, and to those who are to come after her, of any deterioration of her physique would be ill repaid by any results that education could bring; and I certainly think that the less of mental competition she has the better it will be for her. At the same time it is satisfactory to mark that the movement has been attended by a corresponding enlargement of the range and amount of bodily exercise. The gymnasium and the lawn-tennis ground are the antidotes, and therefore the correllatives, to the study; and we may have good hope that the increased and well-balanced exercise of mind and body will lead to a better development and greater strength of both.

A few words on the subject of ventilation. Good fresh air and light are the first requisites for health. Our gardens tell the necessity of them, even for plants, and show that the more the plants are shut up from them the more liable they become to blights and disease, and to imperfect development of colour and form. Fresh air means air in motion. We are quickly conscious of the difference to our powers of work, of attention, or of exercise in a closed room and in one open to the air, on a still day and in a brisk wind, in a screened wooded valley, and on a hill top; and we know that still air is peculiarly favourable to the development of the various organisms which give rise to putrescence and communicate disease. The ventilation and lighting of his house is, to some extent, in the power of each man and is commonly far too little attended to, especially in the

bedrooms. These are generally stuffy, with closed and curtained windows, and are replete with emanations from beds, clothes-boxes and various accumulations under the beds, and dusty corners. The admission of air, scanty during the day, is permitted at night only through the chimney; and often there is not even that sooty channel. Our open fires, needlessly wasteful and therefore costly though they be, are no doubt, a very salutary influence; and they make the contrast between English and foreign houses, which latter are for the most part heated by stoves, much in favour of the English. Still the English houses admit of great improvement, which can be easily made. The air which passes up the chimney from the fire must be supplied through some inlets. Hence, when windows and doors are closed, it comes through crevices in the boards, carpets, &c., bringing with it various impurities; and too often demands are made upon the water-closets and sink-traps. The ill-fitting of the doors and window-sashes of the houses of the poor, serves the good purpose of providing ventilators. But the better houses have not this safeguard; and, as dire experience in high quarters tells us, their inmates too often pay serious penalty for good carpentry added to that apprehension of draughts which is maintained by an ignorance, or an ignoring, of the fact that fresh air is one of the best preservatives against cold and rheumatism, as well as against fevers and debility.

People go to the seaside and bathe themselves all day long in air, and then wonder that, on returning to their pent up houses, they feel unwell, perhaps more so than if they had not left them. The amount of three thousand cubic feet per head, per hour, which has been computed to be necessary for the maintenance of the normal purity of the air, cannot of course usually be supplied; but care should be taken in every house that a ready supply of air is provided from the exterior, and that, night and day, summer and winter, some window, in the chief passages at least, remains open. In many houses there is a fanlight over the entrance. This should be made to open, which it easily can be, though it very rarely is; and it should be kept open, with very few exceptions, throughout the year. This change would make a great improvement in the sanitary condition of our houses. In the country cottages and houses the windows, especially in the upper storeys, are too small and too much closed; and it is distressing to notice how often the dwellings are closely beset or overhung by trees, which shut out both air and light. It were a wholesome rule that no tree should be allowed to stand so close to a house that it would touch it if it fell. But trees are too commonly planted without consideration of the space they will occupy, and the shade they will throw, when

they grow up; and when they have grown up there is a health-disregarding reluctance to cut them down. The courtyards and alleys in towns do not easily admit of rectification. The only effectual plan appears to be that of clearing them away and erecting buildings with better sanitary arrangements on their site, by which, as experience has shown, the mortality of the residents may be diminished without reducing their number. In the rural districts, however, the sanitary state of habitations might be easily and greatly improved by a little attention to the points I have mentioned, and at small expense. The freer admission of air and light obtainable by cutting down over-hanging and closely-adjoining trees, by enlarging and opening windows, by removing curtains, useless furniture and old clothes, by clearing out dusty corners and cupboards, and by filling up stagnant ditches and ponds, would do much to render our agricultural population healthier and stronger, and more vigorous and active in mind and body than they are, and would lessen consumption, rickets, scrofula, fevers, ague, and other maladies, as well as the poor-rates. In short, the small sums thus expended would be well invested, for they would bring a rich return, in the form of abler bodies, with attendant mental and moral improvement, to the land-holder and the farmer, and would enable them better to contend with the foreign producer and the vicissitudes of our home climate.

There is little prospect of these last becoming more favourable. Moreover, the temptations away from agricultural labour, offered by the higher wages and other attractions of town-life, are yearly increasing. The agricultural labourer is therefore becoming a more rare and valuable article; and to improve his sanitary and general condition is the material interest, as well as the bounden duty, of those to whom the land is entrusted. Indeed, we must look to the application of sound sanitary principles to the land—to those, both men and animals who dwell upon it, and to the food-producing plants which grow out of it—as one of the most certain and obvious means of restoring to a prosperous condition that which is still the most important of all our commercial bases, the agricultural business of the country. Some of these sanitary principles, those more especially which relate to men and animals, are clear and ready to be applied at once. Others will require long investigation at the hands of persons who shall be assigned to it, and who shall devote themselves to it in the feeling that they are workers in a great science which must be fraught, more, perhaps, than any other science, with lasting benefit to the human race.

The important points of house sanitation, water supply, food,

engineering, and the great sewage question which it will take some generations satisfactorily to settle, will be discussed in the various sections and need no comment from me. The influence of climate, temperature and locality, including geological formation and elevation, upon health and diseases form subjects which the British Medical Association, through its Collective Investigation Committee, is already enquiring into, and hopes to pursue more fully. These are associated with the investigations into the LIFE-HISTORIES of individuals and families, which that Committee is about to prosecute. The Committee is, indeed, at the present time engaged in preparing a suitable album in which the medical and certain other records of the life of an individual may be made and preserved in the most convenient manner, so that the various phenomena bearing upon longevity and disease—such as hereditary predisposition, temperament, occupation, water-supply, locality, exposures, illnesses, &c.—may be noted and read off at once, and be available for determining diagnosis and treatment in illness, decision as to course of life, and other problems. The advantages of such a system to the individuals themselves primarily, and to the community at large, if it be at all generally adopted, is obvious; and the effect of it upon sanitary and medical science, if well carried out, can scarcely be over-estimated. Among other results, it may be anticipated that it will, in course of time, assist to determine the regions and surroundings most suitable to persons of particular temperaments and tendencies. Instead, for instance, as at present, of simply certifying that individuals are sound in body and mind, and therefore fitted for the Civil Service in India, and so drafting off those who are best fitted to remain in England, the medical or sanitary examiner should be asked to indicate those who would be better in India than in England, and, therefore, most likely to be advantaged by the change. Thus a benefit would be conferred both on England and on India, as well as on the persons more immediately concerned. The same applies to our other Colonies and possessions. In this way the vastness of the Empire, embracing every climatic and geographical variety, may be made a means of improving the sanitary condition of its numerous peoples; and some compensation may be made to the inhabitants of distant lands for the maladies and evils we have carried to them.

Of the cholera I will simply say that I trust the apprehension of it, whether it reaches our country or not, will be turned to good account in clearing away those foulnesses upon which it and other like maladies feed. If its presence be needed to effect this, then in spite of its being, as my slight experience of it told me it is, one of the most awful of maladies, its advent

may prove a blessing. Whatever may be the view about the cordon of quarantine there can be no doubt about the desirableness, in the *first* place, of paying more attention to the condition of vessels, their cargoes, passengers, and crews at the various ports of departure, it being well known that vessels often go to sea in a condition which greatly favours the development of infectious disease, and, *secondly*, of so setting our houses in order as best to modify its shock. To be forewarned in this case—and to have perhaps a year's forewarning—gives the blessed opportunity to be forearmed. Let not the opportunity be lost.

On one point I can safely rely upon your hearty agreement with me, viz., that in addresses of this sort the "half-time system" is peculiarly applicable.

I will conclude, therefore, by the expression, in which also you will agree with me, that this Institute has a great and most valuable future before it in the work to which it allots itself—the work of making man's body healthier, stronger, and better—a work in which He who had the greatest power over man and the greatest sympathy with man was largely pleased to exercise his power. In the prosecution of that work the Institute can scarcely adopt a surer and better method than by carrying out its provisions for the examination of surveyors and inspectors. I trust that these examinations may, each year, have a wider influence; and I beg to commend to the Institute the serious consideration of one of the points I have ventured more especially to bring before you this evening, viz., the importance of the formation of a separate and efficient department of the Government for the superintendence and improvement of the sanitary condition of our towns and villages, of our navy and army, of our ships and their cargoes, as well as of our cattle and of our food-bearing vegetables, and which should also take the necessary steps for a proper education, tested by examination of all who are appointed inspectors of nuisances, sanitary surveyors, and medical officers of health. This I feel to be the great desideratum of our time—the thing we should most strenuously strive to obtain. One means of effecting this, as I have already hinted, would be the promotion of a better representation in Parliament of the medical profession, and of those who have shown themselves to be interested in sanitary improvements. I think also it might be in the power of the Institute to do much good by the circulation, in a cheap form, of simple hints as to some of those sanitary improvements which may, without difficulty, be effected in our homes and their surroundings, in our dress and our food, and in the general management of our children and ourselves.

The Lord Provost—I am sure you will permit me in your name to convey to Professor Humphry the very high regard we have for him for the able lecture which he has so kindly delivered to us. It will be out of the question for me to propose to review that very excellent address, far less to criticise it. I am sure if I attempted to do either the one or the other, I would not be doing that which you desire. We cannot but deplore with Professor Humphry the insanitary condition of the British army when in the field, and dread a repetition of what took place in the Crimea. I therefore do hope that our legislators may have their attention directed to the question brought before us by Professor Humphry with the view to a remedy, because we cannot tell the day when military sanitation may again be as important as it has recently been in Egypt. I dare say the present company will feel as gratified as I do at the compliment paid to the Scottish nation, but probably more was said than we would be inclined to endorse There is, no doubt, a great influx of people from this part of the island to the south. But we have always been in the habit of regarding the south as a field to which we go, not so much to improve our neighbours as to better our-selves. I hope the very wholesome remarks regarding young life made by the Professor will have due weight in those quarters where such advice would be most useful. No one who has given any attention to sanitary matters at all but must know that in early life the seed is sown of a healthy or unhealthy manhood; and therefore it is of the highest consequence that great care be given to the human body in these early years. I have as much reason to regret the absence of our old friend Mr. Chadwick as Professor Humphry. I am quite of the same opinion as Mr. Chadwick, that the cap which Manchester puts on would in many respects also fit Glasgow. I wish that eminent sanitarian were here this evening to give us a warning. I am sure we would have taken it in good part. I trust that the suggestions Professor Humphry has thrown out will be considered by those to whom they were more particularly addressed—namely, the Government; and that in the future more than in the past our Legislature will attend to sanitary matters rather than to other matters which appear to them of great importance, but which to us sink into insignificance when compared with those which affect the health of the nation.

Dr. A. Carpenter—As chairman of the Council of the Sanitary Institute, I rise to second the proposal that has been made to you by the Lord Provost, that we present a hearty vote of thanks to Professor Humphry for his very able and conscientious address. I have some diffidence, after the observations that have been made by the Professor, as a Southern man in appearing before an audience like this, the more so, because as the professor went on I gathered that we had to come to the north not only for brains, but for those very fine feet that we have sometimes in the south, because as I came through your country I observed many persons without shoes at all. I could see the perfection of the form of foot to which the professor has alluded,

and I was satisfied that the discomfort they had without a shoe was given back to them in that beauty of foot and in that freedom from certain disturbances of health that do follow from the confinement in which the foot is kept by those extraordinary articles that are put on them by the shoemakers. But then I observed also that the Professor alluded to education, and I had some recollection that Scotland had taught us a lesson in respect to our schools, by teaching children in the open air, and had sent so many prime examples of great intellects to the south. Then he got on still further, and talked about the Parliamentary representation of the medical profession, and I recollected that Glasgow had done honour to our profession in sending a member of that profession to represent her in Parliament. I do hope that the experience we have gained of the good effects that follow from certain proceedings of the Scotch may have a beneficial influence upon the south, as much as we hope to have a beneficial influence upon you. I never listen to Professor Humphry without gaining some knowledge. I have sat at his feet for many years in various ways, and the address that he has just given has still further convinced me that he will always have something to tell us, something that is instructive, something that is certainly worth hearing. I am sorry that every member present tonight has not brought his wife or his lady-love with him that they might have heard the stirring words which have been addressed specially to the feminine portion of the population. I have great pleasure in seconding the proposal that the Lord Provost has made.

The motion was then put and carried with great applause.

Prof. HUMPHRY—I must return my hearty thanks for the kind manner in which you have listened to me, and still more for the very kind expression of your feelings which has been made by the Lord Provost, by Dr. Carpenter, and yourselves. It ill becomes me, perhaps, to find any fault at all with what falls from one who is so thoroughly and deservedly respected and esteemed by you all, but the Lord Provost did mention one word to which I must take exception. He said that I had paid a compliment to your nation; it was not a compliment, but a simple expression of the truth. Those of you who have in the newspapers lately read the report of the Anthropological Committee of the British Association have, doubtless, seen there that it was no compliment, but, as I have said, the truth, for you will observe that, according to the measurements of that committee, the Scotchman is a taller man and is a stronger man than any other in the empire. In saying that he is taller and stronger than any other in the empire means, I apprehend, that he is taller and stronger than any other in the world. We know that his brain weight is greater than that of any other, and I say also that we cannot help knowing that his brain force is greater too. It may be added the manner in which the Lord Provost has been good enough to express his approbation of the efforts of a Southron to address you this evening is no bad illustration of Scottish character.

SECTION I.

SANITARY SCIENCE & PREVENTIVE MEDICINE.

ADDRESS

BY PROF. W. T. GAIRDNER, M.D., LL.D.,

PRESIDENT OF THE SECTION.

IN the course of the duties which fall to my lot as a teacher of the healing art, I am obliged, as it were, to appear in two characters, because the art itself falls practically and conventionally, if not naturally, into two divisions—separate in idea, and yet, as we shall presently see, inextricably interwoven. "How is this individual patient to be cured of his actually existing disease?"—is the first question to which the art of medicine in all ages has invariably and inevitably addressed itself. How is disease—*i.e.* premature death, disabled faculty of body or mind—to be reduced to a minimum, and as far as may be got rid of, for humanity at large?—this is a second and a far more comprehensive question, in the course of answering which, when he attempts a reply at all, the physician hopes chiefly to get some additional light as to how to deal with the first. In addressing himself to the first question, the physician is led to view diseases simply as so many separately existing facts or species which have to be classified and set apart like objects of natural history, in order that the experience of many men in many ages may be brought to bear on the great question of their cure. And although there have never been wanting philosophic minds which have looked behind this conventional view of a disease, and endeavoured to obtain an insight

into the causes of disease in general, yet it must be admitted that the habitual attitude of the physician towards his patient in all times has predisposed him to accept empirically, as it were, the disease as an existing fact, and to direct his whole energies towards the question how the individual patient, being already ill, can best be treated so as to emerge whole and sound.

Prevention of disease, the great object of modern sanitary science, has too often been regarded as unprofitable; not merely in the coarse sense of being unremunerative, but also in respect that the inquiry into causes belonged for the most part to the class of speculations condemned by the inductive philosophy as destitute of fruit, and therefore wholly insecure and unpractical. Causes were scholastically divided into predisposing, exciting, and proximate; but of these, the last came to be regarded as an idle and metaphysical research, while the others gave rise to long dissertations, not without value, but certainly in most cases without much precision of method or obvious benefit to mankind. In very many instances, accordingly, the physician who applied himself to the study of causes was adjudged to be only losing sight of the object for which he was consulted by suffering humanity; while he who directly applied himself to the cure, and to nothing else, was glorified as being alone, in the real sense of the word, the mediciner, *i.e.*, healer or practical man. And the rewards of professional life being mostly reserved for services of this kind rendered to individuals, the inquiry into causes was necessarily discouraged, and disease came to be largely dealt with as a "visitation of God"—inscrutable in its nature and essence, but yet requiring to be attacked and subdued by remedies, many of which were violent, empirical, and dangerous in their action, in proportion to the supposed danger of the disease.

It was impossible, however, that this onesided view of the nature of diseases should satisfy all minds—or indeed the best minds—devoted to the healing art in any age. All through the history of medicine we can observe the effort to get insight into causes, not merely as a philosophical speculation, but with a view to prevention. The treatise in the Hippocratic writings on airs, waters, and places is one of the earliest, and certainly, in its time, one of the most surprising advances in this direction. The curious and instructive studies of epidemic diseases in the same group of treatises, partly by Hippocrates himself and partly by his successors, give glimpses of insight which it required centuries to develop into principles of secure action, either as regards the prevention or the treatment of such diseases. On the other hand, the almost entire neglect of sanitary research by Sydenham, confessedly the greatest of

English physicians in the 17th century, even when writing at large upon epidemic diseases, shows how few were the principles of preventive medicine that had emerged out of obscurity, even in comparatively modern times; and the long struggle with ignorance and confusion which was required to establish even so simple a case as the dependence of scurvy on an insufficient amount of vegetable juices in the food, shows as well as anything else that up to the very beginning of the present century the attention of physicians was but feebly attracted by facts and doctrines which, had sanitary science existed in any real sense, could hardly have failed to become generally accepted. That it should have taken two centuries to reduce to a practical rule in the navy of Great Britain the measure by which Commodore Lancaster saved his crew from scurvy in 1603 is one of those facts which cannot be got over, and which show that, in a practical sense, preventive medicine and the effective study of the causes of disease is a thing of yesterday as compared with the ages of effort, not wholly unsuccessful, devoted to the cure of diseases. And although the discovery of vaccination alone is enough to redeem the credit of the medical profession during the last hundred years, yet it cannot be said generally that in the great sanitary movement of the present age eminent physicians have always led the van of progress. No one speaking in this place should acknowledge otherwise than with profound gratitude and respect the labours of Edwin Chadwick, of Lord Shaftesbury (then Lord Ashley), and of Lyon Playfair as the pioneers of English sanitary science. Yet it would have been impossible for these distinguished men to have accomplished what they did without the co-operation of medical men, and even of medical authorities. Indeed, the names of Southwood Smith, Neil Arnott, and James Phillips Kay are associated with the movement in this country from its very beginnings in 1842. But the impulse, so far as the general body of physicians was concerned, came from without rather than from within. And it is not to be forgotten also, that M. Pasteur, the most distinguished of living Frenchmen as regards the scientific investigation of the causes and prevention of epidemic diseases, is not a member of the medical profession.

But while it is true that medical science has not always been in a position to initiate discoveries, or to take the leading part in legislation in the direction of sanitary progress, I think it may be claimed for my profession that it has very cordially accepted, and energetically carried out, sanitary reforms of every kind so soon as they came within the scope of practical application by the physician. Of no body of men can it be affirmed with less truth that they have encountered the great

reforms of the last forty years in a hostile or narrowly professional spirit. There was, indeed, an evident possibility that it might have been otherwise. To work towards the prevention of disease deliberately and effectually was not only not remunerative, but might have been construed as directly attacking the sources of income. Yet I believe it will be readily admitted that with all but a small and utterly insignificant fraction of a noble profession this consideration has been practically devoid of influence; while the names of John Simon, William Budd, Charles Murchison, Edmund A. Parkes, John Snow, Edwin Lankester, and many others show that even a considerable measure of success as medical practitioners, in the ordinary sense of the word, is in no way inconsistent with eminence and originality of research in the department which has been called in our programme "Sanitary Science and Preventive Medicine."

One name, that of one recently removed from us by death, deserves a separate mention in this connection, in order that we may join in paying a tribute of love and admiration to a character in which eminent and exact science was singularly blended with gentle humanities and modest personal worth known to many of us here—one who, occupying throughout a long career a position subordinate in his official relations, was able through sheer force of genius to influence the cultivation of sanitary science all over the world, by his love of order and method, as well as by the luminous power of exposition he displayed in dealing with what to most men would have been extremely unmanageable and dry arrays of figures. It is not the first time that I have had occasion to express in public my own personal sense of the enormous debt which sanitary and medical science owe to the late Dr. William Farr; and I will venture to quote to you now a few words written in 1861 when, in the course of what I believe was the first separate course of sanitary instruction delivered to medical students in Scotland, I had occasion to expound in some detail the elements of the science of death-rates* :—

"Dr. William Farr has done for the vital statistics of England almost what Harvey did for physiology or Lavoisier for chemistry. He found the facts of this science in a state of almost hopeless and aimless confusion. He has not only added immensely to the number and value of these facts, but has brought into them light, harmony, order, and, for the first time in the history of the science, a determinate method and an approach to scientific exactness. On the basis of millions of separate details, arranged, on the whole, in a very close and accurate

* Public Health in Relation to Air and Water, 1862.

accordance with medical opinion, and with the demands of sanitary science, it has been the great and enduring merit of Dr. Farr (originally a modest country practitioner of the Company of the Apothecaries) to build up a body of doctrine on vital statistics, not only unequalled, but unapproached in any other country. By the systematic calculation of death-rates he has placed an easy and useful method at the service of all enquirers into the public health,—a method certainly not without risk of error in its application, but giving facilities for the elucidation of truth, and the correction of error, which render it of the utmost value to medical science. By the formation of life-tables from these data, Dr. Farr has also immensely aided the operations of life-insurance; and, by the vast extent of his general information, the vigour of his literary style, and the genial current of his human sympathies, he has been able to invest his dry and abstract enquiries with not a little even of a popular, almost of a poetic, interest. Those who have occupied themselves with the reports of the Registrar-General, or with the most instructive and interesting historical dissertations in the report on the census of 1861, will assuredly join with me in giving to Dr. Farr the credit of having at last solved the problem of investing numbers with a correspondingly real interest, and made large blue-books, and big ones too, among the most stimulating and suggestive productions of the age."

It is somewhat painful and discouraging to have to add to these few lines of very moderate eulogy on a now departed benefactor of mankind, that he who thus gave an impulse to preventive medicine and sanitary science amounting almost to the discovery of a *Novum Organum* for it, was in the end obliged to retire from his work on behalf of the nation with so little of what can be called national recognition of his vast labours and eminent services to the State. It is my earnest desire that these words should be taken in a sense void of offence—*i.e.*, as not imputing blame to anyone in particular in connection with Dr. Farr's resignation of his office, which was unquestionably made necessary at the time by the state of his health. Nor is this expression of regret in any way inconsistent with the opinion that I have always held and expressed, that the medical profession will not advance its own best interests, or the interests of humanity committed to its care, by entering into the competition for honours, dignities, or emoluments at the hands of those who represent the nation. The claim of Dr. Farr to such recognition was not in respect of his being a medical practitioner, but in respect of his being an officer of State, and one who, in almost every particular of high character and unique distinction, must be considered to have justly earned the very highest rewards that the

nation, as such, had to bestow. I hope you will join me in thinking that it is not creditable to us as a people that such services as his cannot, apparently, be more generously rewarded and more highly distinguished during the lifetime of their author. The subject is one, perhaps, not altogether for this Institute; but I have taken the liberty of alluding to it because I happen to know that a proposal to reprint one or more volumes of Dr. Farr's invaluable papers, prepared by himself for such publication, is at this moment in suspense, as it was during his lifetime, because the modest salary of a Government official, and the scanty provision left for his family, did not allow of this being done at the cost, or even at the risk, of those to whom his fame is most dear. Would it not be possible, by a combination of influences emanating in part from this Institute, to secure the co-operation of medical and sanitary inquirers all over the world to this, the best of all possible monuments to Dr. Farr, before the lessons of his life and character have ceased to be vividly present to us? I believe that such a work, could it be provided for either by subscription, or through some society a portion of whose funds might properly be so invested, would become a means of education in sanitary science of the highest possible importance; while a prefatory memoir of the author, carefully and judiciously edited, would leave a moral as well as an intellectual impression which would go far to correct the chilling results of neglect hitherto, and preserve the name of Dr. Farr as an invaluable heritage, not for us only who knew him personally, but for likeminded men everywhere, now and in all coming time. If I earnestly press upon those who are present on this occasion to do what is possible to convert this aspiration of mine into a reality, it is because I believe the future of sanitary science largely depends upon the appreciation of the unselfish labours of those who have devoted themselves to its cultivation in the spirit of William Farr; and I would add as another great living exemplar—John Simon.

In looking to the future of sanitary science and preventive medicine, it is impossible not to anticipate that it will be as cordially aided by the medical profession in the time to come, as it has been in the past. But just as it has grown in importance and in public appreciation, preventive medicine has also become, not unnaturally, more exacting. It demands a special education, special qualifications, special offices and emoluments, and in these offices the devotion of a man's whole time and energy to preventive and sanitary work alone. I am very far from disputing the propriety and necessity of this arrangement in many cases. But I wish to point out that it carries with it the seeds of an evil influence which it is

desirable, as far as may be, to hold in check. The limitation of sanitary functions to men not engaged in medical practice, and of the practice of medicine and surgery to persons who are, or may conceive themselves to be, thereby exempted from all preventive duty, will not be without serious disadvantages. It will tend to split up the medical profession into two sections, perhaps into two more or less hostile camps. It may also tend to make the physician proper, the healer, less careful of the means and appliances of preventive medicine than he would otherwise become. Speaking from my own experience as a teacher, I would say that this would be a grave and perhaps irretrievable disaster to both sides. For the healing art is really, and in a very practical sense, one; and the cure of a disease, if it is to be anything else than mere empiricism, must be largely imbued with a preventive element. In other words, the careful and practical study of the causes of disease with a view to prevention is in many, if not in most, cases a large part of the cure. I have already alluded to the instance of scurvy, where it may be said that the cure emerges directly and exclusively from the knowledge of the prevention. And if it is not so plainly apparent in many other instances that this is so, it is probably only because of our comparative ignorance of the essential conditions both of cure and of prevention. The larger faith now existing in what are commonly called natural means of cure—*i.e.*, physiological as opposed to complicated and disturbing remedies—is the practical fruit of the free recognition of this truth by the medical profession.

Those who are old enough to remember, or who may even now know something about, the complicated and distracting array of medicines and of surgical proceedings which did duty for indispensable remedies in the last age, but which have now passed almost into oblivion, will be in a position to judge how much has been gained for the healing art, in its more limited sense, by the really enlightened modern study of the causes of disease. Were it even possible to suppose that this great advance, in the direction of true science and sound practice, should ever again be undone by the complete separation of preventive medicine from the healing art, the result would, in my opinion, be nothing less than a calamity, both for the one and for the other. It was a strong sense of the imperative necessity of maintaining this connection between curative and preventive medicine that led, more than anything else, to my acceptance, in 1863, of the office which alone gives me any claim upon your attention to-day. As a teacher of practice of medicine, already of some experience, and recently appointed professor of that subject in the University of Glasgow, I was invited by the

authorities to assume the responsibility of the sanitary administration of this great city as its medical officer. It appeared to me that whatever might or might not be the permanence of the connection, the initiation of so great a work was a task not only worthy in itself, but fitted to be of unknown advantage to the students of medicine who might be dependent on me for their instruction. On these grounds chiefly I accepted cheerfully, for what proved to be a term of nearly ten years, the labours and responsibilities of sanitary work. In the discharge of these duties I was aided by a staff of faithful and devoted officers, by the countenance and support of the authorities, and chiefly of that lifelong and still unwearied sanitarian who now sits in the civic chair. It is impossible for me ever to express adequately my sense of the permanent obligation I owe to these men, and to the work in which they were, and are still, engaged. Although the necessities of the city outgrew the original arrangements, and a greatly extended staff appeared to require a different system of administration, I was enabled to retire with a feeling of profound and lasting satisfaction in having acquired a store of literally invaluable experience as a professor of medicine; while, on the other hand, the work has been continued and advanced from year to year by one who has proved himself one of the ablest and most thorough-going sanitary officers in this country—our good friend, Dr. J. B. Russell. I could not venture in his presence to say all that I should desire to say of him, and of the whole sanitary department as at present administered; but I will venture to refer those who wish to know more about it in a compact but comprehensive form, to a paper by him in the "Transactions of the Epidemiological Society of London, Session 1881-82, new series, Vol. 1," on "The Policy and Practice of Glasgow in the Management of Epidemic Diseases, with results." I have only time now to revert to some of the more striking incidents of my own decennium of experience.

During the period referred to—1863-72—we had to deal with several considerable epidemics, which revealed very clearly the weak points of Glasgow sanitation, according to the means and resources which then existed. Among these were a not inconsiderable epidemic of smallpox in 1863; closely following thereon, a really great and disastrous epidemic of typhus fever, lasting from 1863 to 1865, and never completely subdued until it was crossed and merged in a great outburst of relapsing fever in 1870 and 1871, associated with very great want, and misery of every kind, among the poverty-stricken classes who were mostly the victims of this fever. Measles and hooping-cough

also prevailed largely during the year 1871; and as a consequence, no doubt, of so much exposure and misery amid such epidemic conditions, inflammatory affections of the lungs and bronchi carried off nearly one-fourth of all who died during the year 1871, including, of course, an unusually large proportion of infant lives. Although, therefore, the types of epidemic disease which prevailed in these two years were not nearly so directly fatal as the typhus of the preceding seasons, from 1863 onwards, the death-rate continued high, and it was by no means under encouraging circumstances, except as presently to be stated, that I handed over the medical care of the city to my successor. As these various epidemics had revealed thoroughly our weakest points, there was, on the other hand, room for congratulation on our comparative immunity as regards two diseases which, during my term of office, had given rise to a very large epidemic mortality throughout the country. One of these was cholera, which, as is well known, became epidemic in London during the summer of 1866, and in the autumn and early winter of the same year spread very extensively over England and Scotland, causing an especially large proportion of deaths in Leith, and in some of the smaller towns and villages on the east coast of Scotland. In reporting on this subject on the last day of the year 1866, I was able to show that, notwithstanding our terribly degraded and overcrowded population, still living under the scourge of a previous severe epidemic of typhus, we had lost only one in 10,000 of the inhabitants from cholera in the four months, August to November, 1866, against 7·5 in Edinburgh, 6·2 in Dundee, 7·2 in Aberdeen, 2·5 in Greenock, 5·4 in Perth, and no fewer than 24·4 in Leith. Nor was this because the epidemic influence was wanting; for during the same period more than 700 cases of diarrhœal disease were reported and carefully investigated at the Sanitary Office, 108 of which had more or less resemblance to cholera, and were indeed considered as being in all probability cases of that disease, though often in a milder form. Our comparative immunity was universally attributed—first, to the all-important fact of our having a perfectly pure water supply; and, secondly, to the elaborate arrangements made, under the sanction of the Magistrates' Committee, for dealing with the individual localities and persons affected, in the way of cleansing, disinfection, isolation, &c. But of these arrangements in detail there is no time to speak at present. They were, however, approved by almost all classes of the community, and brought out in a remarkable manner the active sympathy and Christian co-operation of all the churches, as will appear from the perusal of a special report

published on the subject in May, 1867.* The other instance in which a very marked check seemed to be imposed by sanitary preventive measures upon an epidemic disease actually widely spread in Scotland at the time, was small-pox in 1871. Not to trouble you with the figures in detail, I will only say that, with one exception (Paisley), Glasgow showed in that year the smallest percentage of deaths from small-pox in all the principal towns of Scotland; and that even with its vast and fluctuating population, open to every kind of epidemic calamity, it has never since been in any considerable degree a prey to that disease. There can scarcely be a doubt, I think, that the attention given to vaccination and re-vaccination from 1863 onwards, as the result of the persistent pressure of the sanitary staff, has been in a considerable degree the cause of that immunity.

In these two instances, then, we were enabled by special circumstances and precautions, the direct result of preventive medicine, to hold our ground in some considerable degree against very serious and appalling epidemics. Why were we not so in the cases already referred to of typhus and relapsing fever? Not, I believe, because these diseases are essentially less amenable to preventive medicine than cholera or small-pox, but because the machinery with which we had to work was wholly inadequate to grapple with their causes. Typhus fever is emphatically, as has been often demonstrated, the epidemic disease proper to overcrowded communities; relapsing fever is the occasional supplement, or additional emphasis, which arises when to habitual and extreme over-crowding there is added the presence of something like famine, or at least a grave and general destitution as respects many of the first necessaries of life. In Glasgow we have long suffered, and in the decade referred to we suffered in a very high degree indeed, from both these causes of disease. This fact was so evident on the surface that it could not but attract at once the attention of the medical officers; but their efforts to deal with it in the face of an epidemic actually existing were from the very circumstances of the case foredoomed to comparative failure. In the spring and summer of 1863, I made, along with Mr. Carrick, the city architect, and his assistants, a minute and detailed personal investigation of all the localities in which fever had been reported to us as having taken an epidemic hold, and the results of that investigation were communicated to the authori-

* Report to the Superintendents and Visitors in the recent Sanitary Visitation Movement, with considerations as to a permanent scheme; also proceedings of Public Meeting and Appendix of relative documents. Glasgow, May, 1867.

ties in October, 1863, as well as in some earlier and later reports. In many cases, and wherever, indeed, we had reason to believe that improvements could be effected by persuasion, without force of law, we were careful to ask the attendance of the owners or factors of property in the epidemic localities; and in very many, indeed in most, instances we were cordially met, and more or less supported in our suggestions for immediate improvements. Windows not opening at the top, for instance, were dealt with by scores, if not hundreds, and although our instructions were no doubt occasionally evaded, they were rarely entirely disowned. At the same time, disinfection of houses and of clothing was assiduously enforced, one of the first acts of the newly constituted Sanitary Department being the erection of a special washing-house and other necessary apparatus for this purpose, at which infected clothing and bedding were carefully dealt with in the interest of the community, and free of all expense and trouble to the parties.

Dr. Russell, in the paper I have already referred to, has told in a connected form the tale both of our difficulties and our partial successes, especially as regards the provision of hospital accommodation for the fever-stricken sick; and how it was a necessary condition, under the first Glasgow Police Act, that a disease should have become frankly epidemic, and been formally so proclaimed by advertisement, before any special powers of dealing with it could be obtained; in other words, that the stable door should be carefully locked only after the escape of the steed had become a very patent fact. But apart altogether from this flaw in our legal machinery, the impression conveyed to our minds, even while using to the utmost the powers then existing for the suppression of typhus fever, was (as I often expressed it) that we were merely scratching the surface; and that as long as the great tenement houses—well called "rookeries," and sometimes "warrens," which abounded in all quarters, but chiefly in the central district, were allowed to exist unreformed, and to be occupied by a class of population constantly deteriorating with the deterioration of the buildings in which they dwelt, there could be no adequate grappling with the problem before us. Two of these "rookeries," as early as July, 1863—one in Argyle Street, the other in the Drygate—had been singled out by us for experiment, in respect of the compulsory diminution of overcrowding, according to the Glasgow Police Act. In one of these I remarked, in first reporting upon it, that "the average size of the rooms (all single apartments) intended for the habitation of a whole family is but little greater than that formally condemned by a Royal Commission as insufficient for a single soldier in barracks." The actual average

of all the single apartments in this immense and complicated building was 497 cubic feet, and the actual occupation of them when our operations began was from three to five persons (in one case six persons) in each single apartment. The Glasgow Police Act gave the power, in such extreme cases, of disallowing altogether the occupation of apartments so small as the above, and thus of putting pressure on the owners to convert single-room houses into "room and kitchens;" and even then power was given to limit the occupation in accordance with a maximum stated in the Act, and indicated in each case by a ticket attached to the door. These powers gradually came into operation, not only in the two large tenements here indicated, but in many others, so that before August, 1864, we were able to report 6360 houses—*i.e.*, individual holdings, mostly single or double apartments—as being under police regulation as "ticketed houses"—*i.e.*, houses the occupation of which was subject to be ascertained by domiciliary visits of the police, and was supposed to be regulated in accordance with the provisions laid down in the Act. In the course of another year (August, 1865) we were able to report a great improvement in the condition of our two first-mentioned "rookeries," which had almost ceased to be fever generators even while the disease was advancing in the city at large. But this temporary immunity of two of the most notorious fever dens, under the extremely stringent regulations adopted, did not carry the conclusion that enough had been done. In the same report that records this immunity, it is affirmed that "without entire reconstruction neither of these properties can be regarded as being brought into a state of proper sanitary regulation." The same remarks might doubtless have been made as regards very many other properties, and especially of a great many in the narrow closes lining the High Street, where a population amounting to nearly 1000 persons on each acre of ground was in constant danger from overcrowding, in many cases in single apartments forming part of large blocks of buildings, with dark airless accesses, and almost every aggravation of nuisance and discomfort—too often with intemperance, immorality, and crime hovering in the track of disease and destitution.

The Glasgow Improvement Act.

It was under these circumstances that the late Lord Provost Blackie, in conjunction with the city architect, Mr. John Carrick, and other well-known and philanthropic minds, devised the now famous, and I believe really most effective, City Improvement

Act,* which was intended to sweep away (but not so suddenly as to give rise to great inconvenience) a large number of those closes and wynds where the worst sanitary features existed, and where, at the same time, there was a prospect that after the clearances a better class of houses might probably take the place of those removed. The administration of this Act has been much canvassed, and even unfavourably criticized in detail; but that it has very greatly diminished the hold of epidemic disease on the parts of Glasgow which it affects, no longer admits, in my opinion, of any reasonable doubt. Now, epidemic disease, from the enlarged and modern sanitarian point of view, is not only a great evil in itself, but also an index to other physical evils of at least equal importance. My attention, as medical officer for the city, was strongly directed to this fact, in March, 1869, when a wave of apparently climatic disease, specially characterised by an enormous increase in the mortality from acute diseases of the chest, swept over the city, and arrested much attention and remark. The Registrar-General in his reports at the time had ascribed this phenomenon almost exclusively to the "northerly and easterly winds" then prevailing. This and many other popular theories of the matter appearing to me inadequate, I made as careful a research as the available returns then allowed into the whole details of this singular increase in the death-rate, hitherto, there was reason to believe, almost unexampled in Glasgow. I found that while it amounted here to 30 per cent. excess in 1869 (as compared with the corresponding period of 1868); in Greenock the excess was 25 per cent., while in the large towns of the east Coast—Edinburgh, Leith, and Dundee—the excess was scarcely more than half as much, and in Aberdeen the difference was quite insignificant. Further, it appeared on more careful analysis that while the excess of mortality was greatest in acute pulmonary diseases, and specially great among the young, the zymotic diseases contributed to it not a little, and also tubercular affections, and among these in a very marked way the nervous diseases of infancy (tubercular meningitis, convulsions, teething, &c.), as contrasted with those of advanced life (apoplexy, paralysis, &c.), which latter showed no tendency to increase. It seemed impossible, therefore, to overlook the evidence that, besides possible climatic causes, there were others operating largely in the case of Glasgow and Greenock to

* An interesting account of an early experiment in the same direction, on a small scale comparatively, but guided essentially by the same principles of active beneficence as were at work in promoting this Act of Parliament, will be found in the Transactions of the Social Science Association for 1859, by Sir James Watson, whose administration afterwards of the City Improvement Act did much to reconcile it to adverse public opinion.

determine so much larger an increase of the death-rate in their case than in that of towns more exposed to cold winds; and that while these could not be excluded from consideration, "the true sources of the excessive liability of Glasgow to such tides of disease and death are to be sought, not in these comparatively accidental circumstances, but in the permanently acting causes of high death-rates, and especially in the low standard of domestic comfort, the overcrowding, general squalor, and physical degradation which are the unhappy characteristics of a large part of the population; and that these again are the direct results of permitting generation after generation to be brought up in houses of the worst construction, in which morality, decency, and cleanliness are alike impossible."*

These conclusions were largely confirmed by further researches made during the years 1870 and 1871, and published in reports presented in the latter year and in 1872. An increase of the death-rate was again subjected to a careful examination, with improved means for its detailed analysis, and at once revealed the large share taken in its production by pulmonary and tubercular diseases, prevailing with increased force wherever the general death-rate was highest and the density of population greatest. Thus it became probable that not only as against zymotic diseases (commonly so called), but also as against those inflammatory, and even those chronic, affections of the lungs which form by far the largest factors in the death-rate, the true preventive medicine was to be found chiefly in improvements directed towards the ventilation, cleanliness, and general comfort of the homes of the poor; and that overcrowding and overbuilding of ground space especially were to be corrected, not only as conducing to typhus fever, but to many other diseases. This was the great object aimed at by the City Improvement Act; and while it was not permitted to me to witness, during my official career, its extended operation, I am nevertheless in a position to declare my belief that the policy so initiated was eminently beneficial, and that it is only by steadily following out the same principles that our great cities can gradually uproot the evils of centuries, and become even moderately healthy abodes for those who are attracted into them in search of work. Glasgow is a city peculiarly exposed to numerous causes of ill-health for its population, because (as I expressed the facts in 1871) "upon a relatively smaller acreage than any, excepting Liverpool, it is breeding

* Report on the health of Glasgow for the first quarter of 1869, with special reference to the unusually high rate of mortality in March, 1869. Presented to the Board of Police by the Medical Officer, May, 1869.

up, from year to year, a much larger proportion of young lives than any other city. The inference clearly is that the sanitary state of Glasgow is in some way connected with its intense productiveness and its too small superficial area. And any one who is familiar with the high, dark warrens of closely-packed tenement houses in this city; its narrow, ill-ventilated closes; its many miles of such streets and closes, without an open space, without a blade of grass, without a tree or a shrub to be seen; its swarms of children pouring forth from such utterly wretched dwellings through dark passages and narrow lanes, with no playground but the street, no bathing-place but the gutter, can be at no loss to apply the moral of the tale which these numbers unfold." *

The improvements which have taken place since these words were written are very great, and most creditable to all concerned; but still, as Mr. Chadwick told us through the mouth of the president last night, there is much to do. Let us hope that the authorities of the present and of the future will, as Milton says, "bate no jot of heart or hope," but will go steadily on in the course that has been so well marked out for them.

Professor Humphry, in moving a vote of thanks to Professor Gairdner for his most practical, most high-minded, and most philosophical address, said it was not to be expected that ever again in the history of sanitary science would they hear an address delivered by one who held the important and engrossing position of Professor of Medicine, and yet had devoted so much of his time to medical sanitary science. They could scarcely ever expect again to have the advantage of a man of high philosophical medical knowledge and science devoting himself to the work of clearing our city alleys and entering into the necessities of a great city to maintain its proper sanitary condition. Personally he felt, and he was sure the audience felt, that all humanity owed a debt of gratitude to Dr. Gairdner, that the city of Glasgow owed that debt in a very high degree, and that the Sanitary Institute and the present meeting were deeply indebted to him, not only for the great work which he had done, but for the lucid, clear, admirable manner in which he had put it before them in the address which they had just heard.

Captain Galton, in seconding, said that as a military man he thought it was most satisfactory to feel that the early development of

* Statistical Tables submitted to the Board of Police on Monday, 19th June 1871; showing the sanitary state of Glasgow, London, and Liverpool, from 1855 to 1870, &c.; with remarks by the Medical Officer. Glasgow, 1871.

sanitation in this country, at least of preventive medicine, had been very largely due to the medical profession in the army and navy. It was through the army and the navy that the interesting facts of preventive medicine had been brought so prominently before the public.

Professor GAIRDNER, in acknowledging the vote of thanks, asked that the Council of the Institute would favourably consider his suggestion in regard to the works of the late Dr. Farr, not perhaps so as to tie them to a movement in it, but simply that the gentlemen on the Council would give their individual consideration to the matter, and see how such a republication as he had alluded to could best be promoted.

Dr. CARPENTER assured the meeting that the suggestion made by Professor Gairdner would be considered by the Council, and if they could see their way to promote the object the Professor had in view, he was sure they would be ready to entertain it; at any rate he would take care that the proposition should be submitted to the Council.

On "The Distribution of Phthisis in the Eleven Northern Counties of Scotland, as ascertained by Statistics extending over a period of twenty-two years," by W. J. SIMPSON, M.D.

ANY additional inquiry into the geographical distribution of Phthisis, a disease which occupies the first place among the causes of death in Great Britain, cannot fail to be of interest to everyone, and more particularly to those who devote their special attention to the diminution, prevention, and cure of disease. Our existing literature on the subject is principally a collection of conflicting opinions. Of recent years high elevated lands are asserted to have a special freedom from Phthisis, and patients are sent to reside there on the assumption that mountain air will prove beneficial. The characteristics of mountain air are rarefaction, purity, dryness, and a large amount of ozone. As purity of air, dryness, and ozone, are found elsewhere than on the mountains, the chief influence is considered to be erected by the rarefaction of the atmosphere, or diminished barometric pressure. The same degree of immunity is, however, asserted to belong to Egypt, the steppes of Tartary, and other low lying places, and patients are sent to these situations where the barometric pressure is not diminished but increased.

Then, for various reasons, the Hebrides, Iceland, and New Zealand, have been held to be freer from Phthisis, than other countries.

Differences of opinion have prevailed, not only in regard to influence of high and low situations, on the prevalence or the non-prevalence of Phthisis, but also as to the effect of sea air, heat, cold, moisture, and other climatic factors.

We very much require definiteness on the subject, which can probably only be obtained from statistics extending over a large series of years.

In former times, and until registration began, it was almost impossible to arrive at any safe conclusion, for the mortality bills were for the most part not at hand, and those that could be got at were generally kept in an indifferent way.

The only statistical data available were those derived from the returns of the army and navy, in which the climates of Malta, Gibraltar, Corfu, the West Indies, and other places, were discussed in their relation to the frequency of Phthisis among the troops. However, the lessons they taught could not have been made much use of, for curiously enough while soldiers at the different stations on the Mediterranean when attacked with Phthisis were by the orders of the army surgeons sent on sick leave to Great Britain, civilians attacked in Great Britain by the same disease were by orders of their private physicians sent to recruit their health at the Mediterranean stations. Notwithstanding this it was never ascertained whether, in point of fact, those patients sent to the more equable and sunny climate of the South got better more rapidly or with greater frequency than the soldiers sent home to the variable and cloudy climate of Great Britain.

Dr. Haviland, a Fellow of this Institute, made the first attempt to put the geographical distribution of disease on a proper scientific basis. In his investigations into Phthisis in England he adopted the ordinary plan of comparing the total number of deaths from Phthisis with the mean population.

I have not however followed the same method of calculation, for I consider that by comparing, as he does, the number of deaths from Phthisis with the number of the population, a result is obtained which will not be correctly comparable with the result obtained by the same process in another district. In fact it leads to fallacious conclusions, for the localities compared may differ to a wide extent in their general death-rate. One locality may have its inhabitants dying from all causes at the annual rate of 30 per 1000, while another has its inhabitants dying at the rate of only 15 per 1000. Both might show a death-rate from Phthisis of 2 per 1000, an expression that would *per se* naturally convey the idea that the two districts were equally liable to the disease, a conclusion which is however quite erroneous, because in the district where there are alto-

gether 30 deaths per 1000 of the population only two of these arise from consumption; whereas in the district with only 15 deaths per 1000 of the population, there are actually 4 deaths from consumption out of every 30, which is just double the former ratio.

The only way in which these errors can be avoided, if comparing at all with the population, is to have the death-rate adjusted to a common standard, and the deaths from consumption in each locality raised or depressed accordingly.

Under these circumstances, for the present I have preferred to compare the deaths from Phthisis with the deaths from all causes, and worked out the results in per centages. Living in Aberdeen it was impossible to make these researches from the books in the Registrar-General's Office at Edinburgh; other means had therefore to be adopted to gain the necessary information. It could only be obtained by putting myself into communication with the numerous registrars in the North of Scotland, and inducing them to fill up a printed form supplied to them, noting down in the several years all those cases marked in their books Phthisis, or pulmonary consumption, as the cause of death. When the object of the research was explained to the registrars, the majority of whom are schoolmasters, they co-operated most readily with me, supplying me with all the required data, and giving a good deal of additional local information; a large number went so far as to give the ages, and in a parallel column the number of deaths from bronchitis and inflammation of the lungs.

I now avail myself of the opportunity to express my thanks to them for their kind co-operation and assistance. It has been to them an undertaking which has involved a large amount of labour and search through the books. We are therefore indebted to them for these statistics which extend over a period of 22 years, from 1861 to 1882 inclusive, and include no less than 322 separate registration districts.

At this stage of the investigation it will be enough to put down the leading facts elicited by the elaboration of the statistics, and the general conclusions to be drawn from them.

The eleven northern counties of Scotland to which I have confined my researches, although occupying an area of 14,493 square miles, the whole of Scotland being 29,819·8 square miles, are very sparsely populated, and according to the census of 1881 only contain 708,090 inhabitants, out of 3,735,573 in Scotland, so that, though the registration districts dealt with cover nearly half of Scotland, they contain only about one-fifth part of the inhabitants. The whole area may be said to be rural, for excepting Aberdeen with a population of 110,000,

and Inverness with 22,000, there are no large towns in it. It is also a part of country well adapted for an inquiry into the climatic influences on such a disease as Phthisis, for by its situation and physical geopraphy it presents great points of difference. There is, on the one hand, a large inland tract, some portions of which are elevated between 1,500 and 3,000 feet above the level of the sea. On the other hand, there are the low lying districts of the sea coast facing east, north, and west exposed to the various winds. The east side has its shores washed by the comparatively narrow German ocean, and has a moderate rainfall.

The west side washed by the broad Atlantic has an excessive rainfall.

The centrally situated high mountainous districts have in winter a large snowfall and intense cold. It is evident that between these elevated lands in the centre, and low-lying grounds on the sea coast, there is room for great variety in climate.

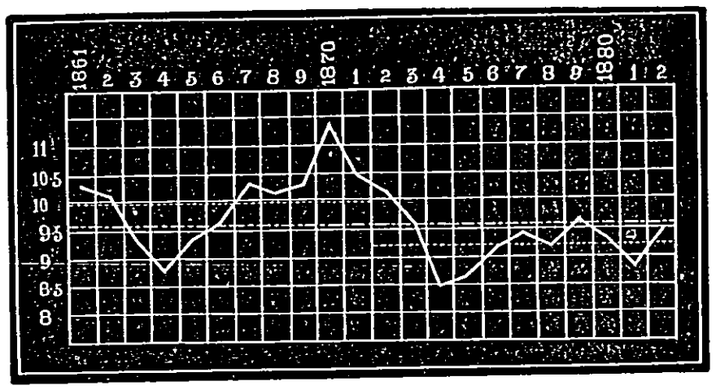
In the North of Scotland, not including parishes from which I have not received any returns, during the 22 years there have been 244,483 deaths from all causes, equal to the annual rate of 16·92 per 1,000 of the mean population, of these 24,259 have been from Phthisis, or 1·680 per 1,000, being nearly in the proportion of 1 death from Phthisis in 10, or more correctly, 9·92 per cent. of the total deaths. Excluding the City of Aberdeen, where during the last ten years, there has been an almost continuous decline of Phthisis, probably due to sanitary operations, the deaths from Phthisis in the Northern Counties vary considerably, thus they rise to 11·33 per cent. of the total deaths in 1870, the worst year in the period. The individual years vary considerably, thus the deaths from Phthisis rise to 11·33 per cent. of the total deaths, in 1870, which was the worst year in the period, and decline to 8·50 per cent. in 1874, which was the best year.

The totals for the different counties are given in a Table on page 98.

It will be seen that the mortality from Phthisis delineated on the accompanying chart, after declining in the years previous to 1864, continues to rise until 1870, after which it comes down every year until 1874, when it again assumes an upward tendency, but never reaches so high, as in the former eleven years. Comparing the first eleven years with the second eleven, there is a decided decrease. The average of the first eleven years is 9·97 per cent. of the total deaths, or 1·599 per 1,000 of the population; while that of the second eleven years is 9·22 per cent., or 1·455 per 1,000 of the population. A decrease of ·75

per cent., which, when stated in this way, appears to be but a trifling decrease; but ·75 per cent. represents an actual lessening of the deaths from Phthisis by more than 800 in the eleven years. There has also been a decrease in the general mortality from all causes. In the first period of eleven years, the average mortality was annually 16·03 per 1,000 of the population, in the second it was 15·80 per 1,000 This rate of decrease, however, is not nearly to the same extent as the rate of decrease in Phthisis. If the rate of decrease from all causes was represented as 1, the rate for Phthisis would be 17.

Diagram showing the proportionate mortality of Phthisis to the total deaths for the eleven Northern Counties of Scotland, from 1861 *to* 1882. *The Statistics for the town of Aberdeen are not included.*



The following are the figures from which the diagram has been prepared:—

1861.—10·25	1869.—10·30	1877.—9·40
1862.—10·10	1870.—11·33	1878.—9·25
1863.— 9·25	1871.—10·50	1879.—9·60
1864.— 8·77	1872.—10·11	1880.—9·30
1865.— 9·35	1873.— 9·57	1881.—8·70
1866.— 9·60	1874.— 8·50	1882.—9·50
1867.—10.35	1875.— 8·60	
1868.—10·15	1876.— 9·05	

Taking the actual numbers there were 99,581 deaths from all causes in the first period, and 99,102 in the second, being a decrease of 479 deaths, although the population was larger; but there was in the same period a decrease of 808 deaths from Phthisis alone.

As previously mentioned, the average deaths from Phthisis for the North of Scotland was 9·92 per cent. of the total mortality.

Examining the counties, we find that some arrange themselves above and some below that average.

Including the towns those above the average are:

	Per cent. of Total deaths.		Per 1000 of Population adjusted to the varying death-rates.
Elgin	11·03 ...	or ...	1·899
Shetland	10·66 ...	„ ...	1·805
Sutherland	10·63 ...	„ ...	1·800
Orkney.....	10·40 ...	„ ...	1·760
Aberdeen	10·26 ...	„ ...	1·736

Those counties below the average are:

Caithness	9·70 ...	„ ...	1·663
Banff	9·60 ...	„ ...	1·625
Inverness	9·48 ...	„ ...	1·605
Nairn	9·34 ...	„ ...	1·582
Kincardine	9·25 ...	„ ...	1·566
Ross and Cromarty.....	8·66 ...	„ ...	1·467

excluding in the several counties such towns as possess over 10,000 inhabitants, such as Aberdeen, Peterhead, Inverness, Elgin, Stornoway, and Wick. The counties arrange themselves somewhat differently.

Those above the average are:

	Per cent. of Total deaths.		Per 1000 of Population adjusted to the varying death-rates.
Shetland	10·66 ...	or ...	1·805
Sutherland	10·63 ...	„ ...	1·800
Elgin	10·61 ...	„ ...	1·800
Orkney	10·40 ...	„ ...	1·760
Caithness	10·31 ...	„ ...	1·747

Those below the average are:

Banff	9·60 ...	„ ...	1·625
Aberdeen.....	9·37 ...	„ ...	1·585
Nairn	9·34 ...	„ ...	1·582
Kincardine	9·25 ...	„ ...	1·566
Inverness	9·17 ...	„ ...	1·553
Ross and Cromarty.....	9·03 ...	„ ...	1·528

The range of difference in the percentages in the counties is not great. Elgin or Moray has the worst position with 11·03 per cent., Ross and Cromarty has the best with 8·66 per cent.

During the last eleven years the deaths from Phthisis de-

crease in eight counties, remain stationary in one county, and slightly increase in two counties.

Those counties where a decrease takes place are:

	Per cent. of Total deaths.		Per 1000 of Population adjusted to the varying death-rates.
Nairn	2·68 ...	or ...	0·660
Sutherland	2·29 ...	„ ...	0·387
Orkney	2·28 ...	„ ...	0·387
Shetland	2·01 ...	„ ...	0·340
Banff	1·18 ...	„ ...	0·199
Aberdeen	1·07 ...	„ ...	0·180
Kincardine	1·05 ...	„ ...	0·177
Elgin	·66 ...	„ ...	0·099

Inverness remains stationary.

Those that increase are:

	Per cent. of Total deaths.		Per 1000 of Population adjusted to the varying death-rates.
Caithness	·59 ...	or ...	0·236
Ross and Cromarty.....	·20 ...	„ ...	0·033

The continuous decline of Phthisis from the year 1870 until 1874 is remarkable, more especially that it occurs in all the counties.

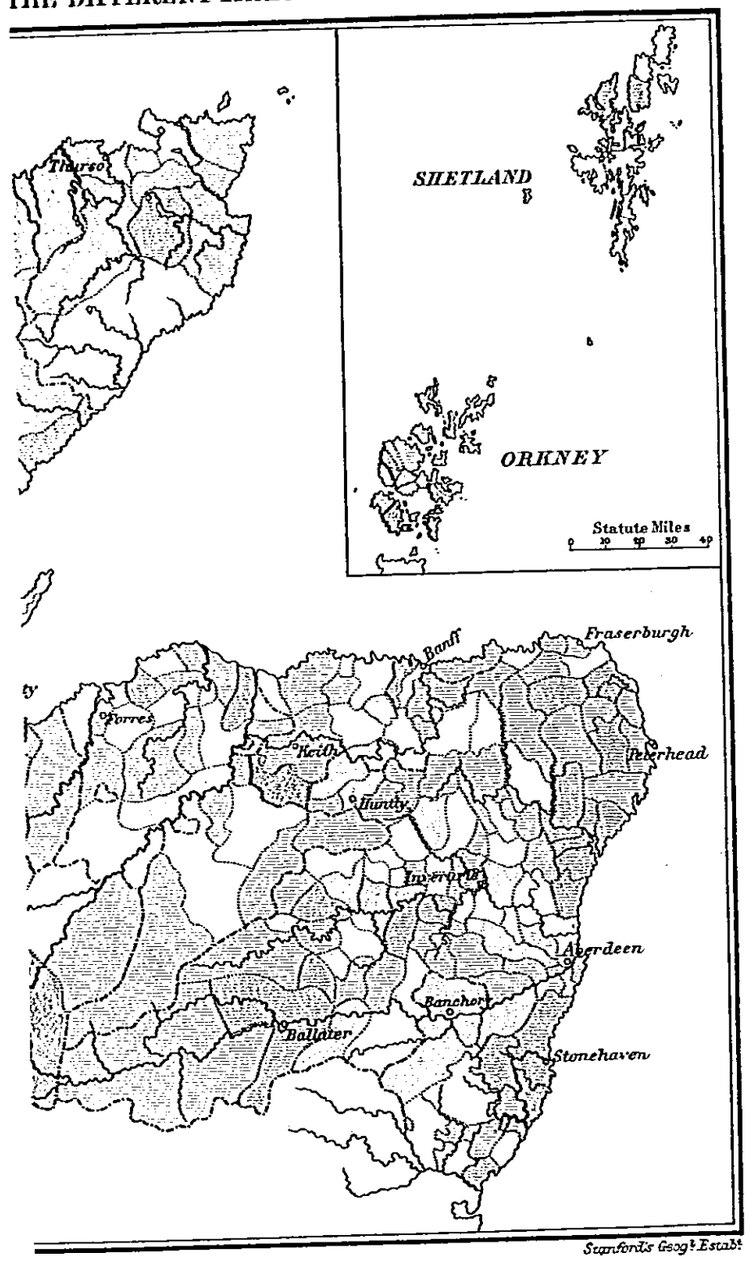
Though there is a certain uniformity about the counties when taken as a whole, and they do not show a great range of difference in their liability to Phthisis, yet, when the component parts or registration districts of each county are examined, they present an unexpected variety. Side by side lie parishes or districts that contrast, to an extreme degree, in their prevalence of Phthisis, or what may be called their productiveness of that disease.

The map shows the proportionate distribution of the disease in the different districts. The blue colour indicates the districts above the average, the deeper the blue the worse is the district.

The carmine colour indicates the districts below the average, the deeper the red the better is the district. The deep blue and heavy carmine stand at the two extremes. The colours of lesser depth approach one another until the light blue represents just above the average, and the light carmine just below the average. The blank spaces, or those not coloured, denote parishes from which no returns have been received.

One of the most noticeable features in the map is the deep blue appearance of the north-west coast. The ridge forming

THE DIFFERENT PARISHES IN THE NORTH OF SCOTLAND.



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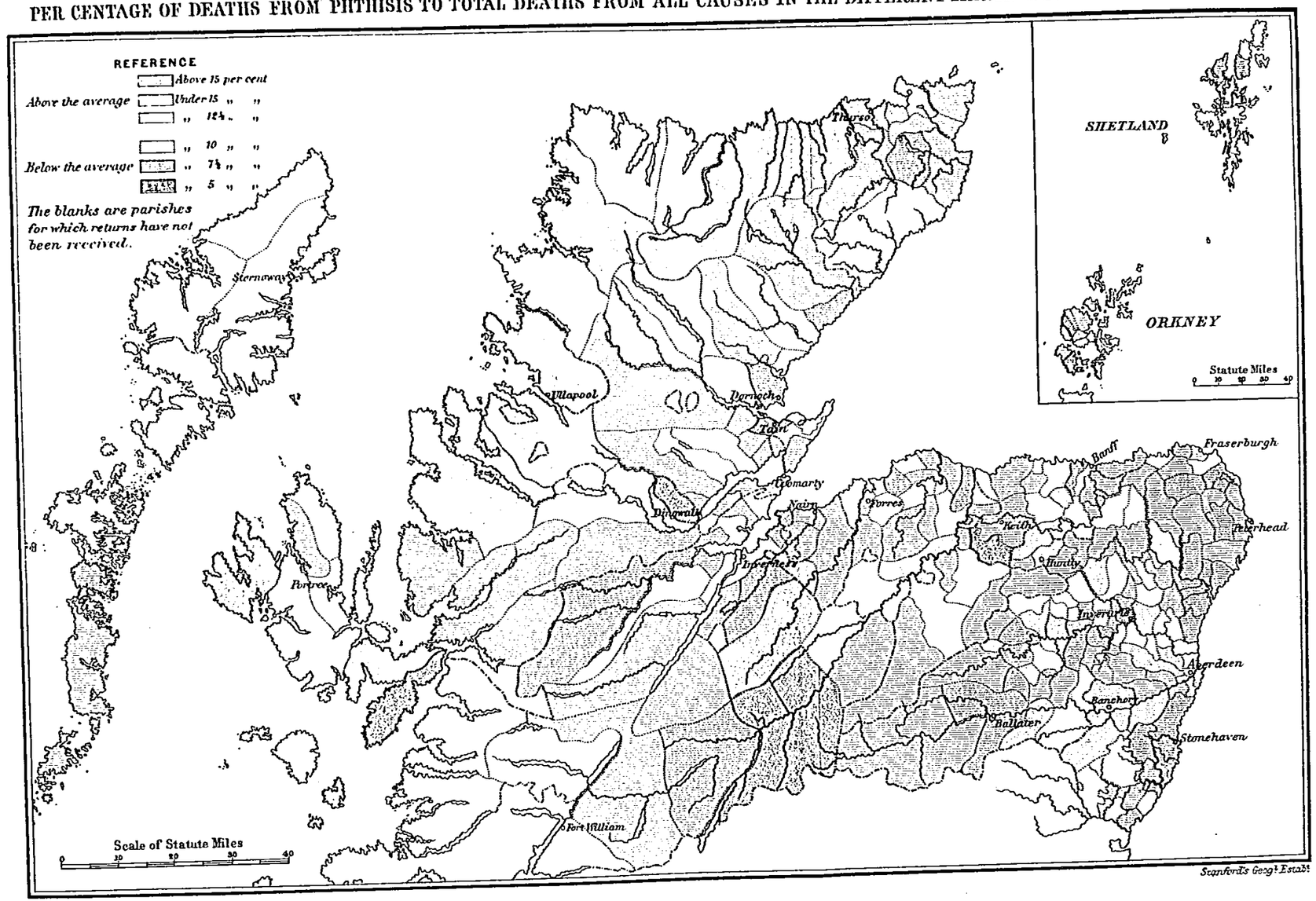


the water-shed divides the land into two portions, the one sloping to the west and north-west, and the other sloping to the east. This water-shed appears to have an intimate relation with the prevalence of Phthisis, because for the most part it gives a distinct character to the districts on each of its sides.

That part of the country on the west of the water-shed has a high percentage of deaths from Phthisis, that on the east side has a comparatively low percentage.

The peculiarly unfavourable character of the north-west coast cannot be attributed to its proximity to the sea, for both north-east and north-west share this alike. Rainfall may have some influence, but not of itself, for in those localities further south, on the west coast, where the rainfall is even greater than on the north-west, Phthisis does not prevail to so great an extent, but the excessive rainfall combined with the cold north and north-west wind, producing a cold damp climate, may have an important share in the production of Phthisis. There are, however, apart from these unfavourable climatic conditions, local circumstances which may even have a greater influence. They are—poor living, insufficiently warm clothing, hovels of dwellings, and last, but not least, close intermarriage. Coming to the east coast it does not as a whole suffer much from Phthisis; the majority of its districts are below the average. On the coast of Kincardine and Aberdeen there is scarcely a break in its comparative freedom. The district of Kinneff and Catterline is below 5 per cent. A large number of the districts are below 7½ per cent., and there are only a few districts on the east coast above the average. With the exception of Tarbat, in Cromarty, there are none that have the deaths from Phthisis above 12 per cent. Even the average for the past twenty-two years of Aberdeen is only 11·03 per cent.; its worst average was during the first period of eleven years; during the last eleven years its average came down to 10·50. The easterly winds to which these parts are exposed are evidently not the producers of Phthisis to the extent for which they commonly get blamed; and the connection between catarrh and consumption is not so intimate as pathology might lead us to believe.

Directing our attention to the inland districts we find the approach to uniformity, which was noticed on the east coast, disappears. Localities where Phthisis is very prevalent border on others that are comparatively free. In Aberdeenshire the districts of Keig, Tullynessle, Forbes, Auchindoir, and Alford, which adjoin each other, are above the average, contrasting strongly with the neighbouring parishes of Monymonk, Tough, and Kildrumy, which are well below the average.

Along the northern bank of the river Dee, from its mouth

westwards to Ballater, and along both banks beyond Ballater, the districts are comparatively free from Phthisis. From Ballater, there is north of the Grampians a stretch of country, varying from fifteen to twenty miles in breadth, extending to Fort William on the west coast, which is very free from Phthisis. In the districts of Alves, Kingussie, and Insch which adjoin each other, and which are a part of this stretch of country, the deaths from Phthisis are under 5 per cent. For the most part, along the whole of the narrow tract from the German Ocean to the Atlantic, a sandy soil, resting generally on a gravelly basis, prevails along the banks of the Don, the districts with few exceptions are above the average. The districts on the north-west banks of the Spey, until the river reaches the highlands of Alves, Kingussie, and Insch, are above the average.

Then we have the parts along the Caledonian canal comparitively free. Amidst the glens of Inverness, Ross, and Cromarty Phthisis occurs only to a limited extent.

The famous watering place, Strathpeffer, shows a freedom far above the average, but this may be due to the very small number of inhabitants that reside there during the winter.

Tain and Dornoch enjoy in their sheltered positions a remarkable immunity. The horse-shoe shaped hills in Ross and Cromarty enclose valleys protected from the north-west wind. The valleys are moderately free from Phthisis, while the exposed parts have an excessive death-rate. Similarly, the strath of Helmsdale, protected from the north-west wind, with the best part of Caithness, all low lying, is comparatively free from consumption.

It is apparent that high altitude has no particular influence in the determining whether Phthisis shall be present or not in a locality. The parishes of Alves, Kingussie, and Insch are remarkable for their freedom from Phthisis; but there are neighbouring parishes at a similar elevation where Phthisis is very prevalent.

The Highlands do not in any particular degree enjoy a greater immunity in their liability to Phthisis than the sea coast on the east.

Now let us consider the Hebrides, and the question that presents itself to our minds for an answer, will be—Are they free from Consumption? Do they sustain the reputation for freedom from Phthisis, which they acquired ever since the writings of Mr. Morgan and Dr. Macrae. The answer must be no, they in no way deserve the reputation they enjoy, quite the reverse, for the islands show in large part a percentage above the average, and in some localities the percentage is very high. The only portions that are comparatively free, are South Uist and Benbecula, in the Outer Hebrides and the district of Steat, which is one of the subdivisions of Skye.

There is one island that may be said to be free from Phthisis, it is St. Kilda. But this remote island has so small a population, and consequently so few deaths altogether, that the fact of Phthisis not being known there proves nothing.

The foregoing are simply the facts elicited by the research. The reasons for the differences in the districts cannot be ascertained with any degree of accuracy without a more lengthened and minute enquiry. Any hasty inferences would be worse than useless, but up till now the broad general facts brought out by the statistics enable us to sum them up as follows:—

I. That Phthisis has decreased in the North of Scotland during the last eleven years.
II. That Phthisis is more prevalent on the North-West coast of Scotland than on the North-East.
III. That the east wind is not productive of Phthisis.
IV. That the elevated portions of the country do not stand out prominently, even although they are more thinly populated, as being freer from Phthisis than the sea coast on the east, or other low-lying situations.
V. That the Hebrides are not free from Phthisis.
VI. That local conditions, whether they be social or geological, or both combined, appear to have a greater influence on the prevalence or non-prevalence of Phthisis than any general climatic agency.
VII. If there is any climatic influence, the north-west wind, combined with excessive rainfall, proves injurious.

Captain Douglas Galton, R.E., C.B., thought Dr. Simpson's paper did not appear to offer any very solid foundation for enabling them to judge of the prevalence of phthisis. He had brought out that in some districts phthisis was not so prevalent as in others adjoining offering the same conditions. Might it not be that the distribution of phthisis in different parts of the country was due to local conditions mainly, and it would be of great advantage if Dr. Simpson could find time before a future meeting to examine into the local conditions of the inhabitants of the several districts, and see whether these would not offer some clue to the distribution. As to Dr. Simpson's remarks regarding phthisis in the army, it was largely due to local conditions, and owing mainly to the improved condition of barracks and to the greater attention paid to clothing, diet, and to the effect of light duties, the disease had practically disappeared from the army.

Inspector-General Lawson admitted that the improvement in barracks had contributed very much to the reduction of phthisis, but other causes had also contributed to this result. As to Dr. Simpson's statement that medical practitioners in this country sent their patients to the Mediterranean for the benefit of their health, while the military men there sent their patients home to England, he was under a mistake in assuming that the latter were sent home for the benefit of their health. The reason why the men were sent home was much more on account of their unfitness for duty, and from the circumstance that they did not seem to improve out there.

Dr. M'Vail, Kilmarnock, said that he had been very much struck with the prevalence of phthisis and tubercular disease in the town in which he practised. He found they enjoyed the bad pre-eminence of having the very largest tubercular death-rate. In 100 deaths there were 20 from tubercular disease, and of these over 15 from phthisis. In endeavouring to get at the causes of this large ratio, and making a selection of these, he found one stand out pre-eminently. The food of the people, although not too good, was not worse than in other places. Then, in the town there was a very large number of houses of only one apartment, but not a greater proportion than in Glagow and other towns. There was, however, one other thing —the condition of the soil, which was chiefly composed of clay, and was retentive of damp. Kilmarnock lay in a very low level; it was surrounded on all sides but one by hills; the rainfall was heavy; the prevailing winds were south-westerly and westerly, and the consequence of this was, that while their phthisis rate was very high, the rate from inflammatory respiratory diseases was very low. He did not think that the large phthisis rate was due to that disease being written down in cases in which the disease was really bronchitis, because some other towns in the south-west corresponded with Kilmarnock in having a low bronchitis death-rate. These factors seemed to him to bear out pretty much what Dr. George Buchanan had discovered in regard to the prevalence of phthisis in some counties in England. It was important that they should recognise the fact that in different circumstances phthisis might have very different causes. Probably the most important truth was this—that tubercular diseases were thoroughly within the domain of sanitation, and that they had as much right to be included in the province of the medical officer of health as zymotic diseases had.

Mr. G. J. Symons, F R.S., London, considered that the real secret of the difference in the prevalence of phthisis in particular districts would be elicited by individualising facts more thoroughly tl an had yet been done. He was inclined to think it was more likely to be a question of subsoil than the author supposed. He further thought that a great deal depended upon the geology of a district, and if they had had the geological map of the north of Scotland in connection with the map exhibited by Dr. Simpson, it would have thrown

considerable light upon the subject. He had great pleasure in proposing a vote of thanks to Dr. Simpson.

Dr. A. Carpenter said the paper directed attention to several points of considerable importance; but they must not lose sight of the fact that it was in a great measure after all an inquiry into the antecedents of the individual case that would give them the information they wanted. For instance, it was proved on all hands that a damp sub-soil tended to promote phthisis, but that was only a small part of the case. There was a tendency on the part of inhabitants in those exposed regions to crowd together for warmth and dryness, a practice which conduced to the growth of phthisis, by encouraging the manufacture of impure air, and then there was the hereditary tendency in a family where phthisis was so much more easily brought out in life than in those free from it. He expressed the opinion that phthisis was a disease which was preventable, and that it came within the province of the Institute, as much as fever or any other infectious disease that was dependent upon outside influence. Dr. Simpson's paper directed attention to several points that were of considerable importance, but they must not lose sight of the fact that it was in a great measure inquiry into the stock and into the antecedents of the individual case that would give them the information they desired. He had pleasure in seconding the motion.

Professor Gairdner believed the north-east and east winds had much less to do with phthisis than was commonly supposed to be the case. He regarded the important paper now read, and the map which accompanied it, not as settled information, but as materials for future information. Dr. Simpson should simply make the paper the initiative for future inquiries. He should carry on his investigation particularly in regard to certain districts which looked paradoxical or extreme, and so be enabled to give his information more in detail. One fallacy which ought to be kept in view was the various names by which phthisis was known in different localities, while another influence very subversive of accuracy on this point was the tendency of insurance societies in districts where their business extended to create an indisposition to the use of the word "phthisis," in registering the cause of death. Without in the least degree attributing any improper motives to anybody, he would say, the ordinary influences of human nature tended to make phthisis appear less frequent than it was. All these fallacies had got to be discounted, as it were, in any research on this subject. He would entreat Dr. Simpson, in future enquiries, not to keep in view phthisis alone, but all the diseases of the chest, and their comparative death-rates, and also forms of diseases notably and largely tubercular, although not necessarily called so, particularly the nervous diseases of children, besides scrofulous and other diseases. He did not believe in winds doing much injury, but he did believe to an enormous extent in domestic conditions as a cause of phthisis.

Dr. Simpson briefly replied,

COUNTY.	Mean of Population 1861 & 1882. Balances.	Total Deaths during the 22 years. Balances. 1 From all Causes.	2 From Phthisis.	Percentage of Deaths from Phthisis to Total Deaths. Balances.	Average Annual Death Rate for 22 years per 1000 Mean Population. Balances. 1 From all Causes.	2 From Phthisis.	Death Rate from Phthisis when adjusted for General Death Rate.	Actual Total Deaths during 22 years. 1 From all Causes.	2 From Phthisis.
I. NORTHERN DIVISION.									
1. Shetland	21681	7147	762	10·66	14·98	1·599	+1·805	10401	
2. Orkney	32202	10567	1099	10·40	14·91	1·551	+1 760	10567	1099
3. Caithness.....	40912	14783	1434	9·70	16·42	1·614	−1·663	14783	1434
4. Sutherland	20068	7050	750	10·63	15·96	1·699	+1·800	8004	
II. NORTH-WESTERN DIVISION.									
5. Ross and Cromarty	75011	27127	2351	8·66	16·43	1·425	−1·467	29418	
6. Inverness	77814	29534	2802	9·48	17·25	1·637	−1·605	32302	
III. NORTH-EASTERN DIVISION.									
7. Nairn	8622	3413	319	9·34	17·99	1·682	.....	3413	319
8. Elgin or Moray	44746	16953	1870	11·03	17·22	1·899	+1·865	16953	1870
9. Banff	56152	20321	1950	9·60	16·45	1·580	−1·625	21040	
10. Aberdeen.....	244039	95254	9778	10·26	17·74	1·821	+1·736	96659	
11. Kincardine	35157	12334	1142	9·25	15·94	1·476	−1·566	12334	1142

* Balances implies that a proportionate reduction has been made for those places from which returns have not been received.

On "Cholera Epidemics: their Etiology, Modes of Diffusion, and Preventive Measures, with Special reference to Quarantine," by J. CHRISTIE, M.D.

ETIOLOGY.—At the International Sanitary Congress, held at Vienna, in July, 1874, it was unanimously affirmed that "Asiatic Cholera, susceptible of spreading epidemically, is spontaneously developed in India, and when it breaks out in other countries it has always been introduced from without. It is not endemic in any other country but India." To these propositions I cannot assent; for it is impossible to say more than that cholera is endemic in India, just as we say that enteric fever is endemic in this country. We, as yet, know nothing regarding the origin of the disease; nor can we say, in any case, that it originates spontaneously or *de novo*, though there is no reason why we should conclude that it never originates *de novo*. What happened once, when the first cases appeared, may, under similar combinations of circumstances, happen again; but what combination of circumstances would certainly, or even probably, give rise to cases of cholera we have no conception of. There is certainly nothing in the manners and customs of the inhabitants of India, nor in the climate thereof, as distinguished from the manners and customs of the inhabitants of other tropical countries, that can give us any clue to the etiology, or the intimate pathology of cholera.

Medical men who have made this subject a special study, both in this country and in India, maintain views diametrically opposed to each other, as to the genesis of cholera, some affirming that the disease depends upon the presence of specific germs, or micro-organisms, which, having gained access to the human body, multiply to an enormous extent there, giving rise to the various phenomena of the disease; while others, to use the language of Sir Joseph Fayrer, "admit the existence of a poison of some sort—a miasm or an influence, though of its nature they are ignorant. It is a subtle thing that travels in certain directions in obedience to certain laws, is influenced by atmospheric and telluric conditions, and where it goes and finds certain local conditions, and people prepared by them to submit to it, there cholera will prevail. They deny the efficacy of any enteric or specific poison in the water to produce it, though they attach the greatest importance to the purity of water from

all organic contamination, impure water being one of the local conditions which, if added to crowding, filth, or other insanitary conditions and want of proper ventilation, is that, of all others, which favours cholera." The germ theory is that which finds most favour with epidemiologists in this country, while the latter is that most generally accepted by those in India, though many in India give their adherence to the germ theory,

The question is by no means settled yet, but we may reasonably expect that important advances towards its solution will shortly be made by the scientific commissions which have been sent to Egypt to investigate the etiology of the recent outbreak of cholera there. The chief interest will centre on the investigations of M. Pasteur and his colleagues as to the existence of bacilli in the tissues or excreta of those suffering from the disease; but whether such micro-organisms be or be not discovered, our views regarding the modes of propagation will not be greatly altered or modified. The germ theory is within the province of scientific investigation; but the subtle miasm or influence that travels in certain directions in obedience to certain laws, and which is influenced by certain atmospheric and telluric conditions, is beyond the region of scientific research.

MODES OF DIFFUSION—In investigating the modes of diffusion, or propagation, of cholera, or of any other disease which is liable to become epidemic, we must commence our investigations at the sick, not at the dead. Our starting point must be at the bedside, not at the books of the Registrar; but if the statistics of the Registrar are to be utilized for any practical purposes, they can only serve as guides to the locality where the investigation must begin. The bare statement that as many deaths from cholera occur in Calcutta in the month of February, and that they gradually increase in number till April, and decrease till the end of May, a period of storms and showers, is of some interest as a statement of facts; but is of no value whatever either in respect to the etiology or the propagation of the disease. It has been affirmed, again and again, that cholera and enteric fever "may have different modes of working in India and in Europe"; but it is much more probable that the varying results obtained depend more on the different modes of investigation.

The most startling statement that I have read for many a day is contained in the 18th Report of Dr. Cuningham, Sanitary Commissioner with the Government of India, p. 127, when he says:—"The experience of fairs and other gatherings in this country (India) has, again and again, testified to the truth of the conclusion that cholera is not carried by persons

from one locality to another, so as to cause persons not themselves exposed to the necessary local influences to become affected by the disease. Coincidences certainly can be cited, in which the arrival of persons from a cholera-affected district has been closely followed by an outbreak of the disease; but even these coincidences are far fewer than is generally supposed." The statement of the highest sanitary official with the Government of India that cholera is not carried by persons from one locality to another so as to cause persons not themselves exposed to the necessary local influences to become affected by the disease, certainly demands explanation at the present juncture of affairs. What are the *necessary local influences?* From a careful perusal of the Report which has just been issued, I can form no conception as to what these *necessary local influences* are. If the disease be not transmissable by persons, I cannot imagine that it can be transmissable by any of the belongings of persons, such as clothing, or that it can be transmissable at all. If so, I, in conjunction with my late lamented friend, Mr. Netten Radcliffe, have been engaged in writing a work of fiction called a "History of Cholera Epidemics in East Africa."

That the views of Dr. Cuningham are not universally adopted in India is evident from a perusal of the eighteenth Report of Dr. Furnell, Sanitary Commissioner for Madras, dated 1882, which contains several cases of thoroughly-investigated outbreaks of cholera within the Presidency, more especially in connection with the great annual feast at Tirupaté.

The local conditions necessary for the diffusion or propagation of cholera are local conditions of filth, the more important of these being a local supply of portable water exposed to excremental pollution. I do not, by any means, hazard the statement that water polluted by the excreta of a cholera patient is the only mode of propagation, but I maintain that it is the chief, and that, in every case where great and sudden outbreaks have occurred, the *origo mali* has been traced to such polluted wells. In May, 1865, the number of pilgrims at Mecca was estimated at about 100,000; and during the celebration of the rites from 10,000 to 15,000 fell victims to the disease, two-thirds of the deaths having occurred during the six days over which the rites extended while the pilgrims were at Arafat and the Valley of Muna. Previous to the celebration of the rites each pilgrim, standing at the side of the well, has a bucket of the water poured over him, and he drinks as much of the water as he can, the water poured over him passing back into the well. In writing on this subject in 1876, I called attention to the fact that, if any of the pilgrims were at the time suffering from cholera, or had cholera-tainted garments about them, the well of Zem Zem

would certainly be poisoned, and that the fearful mortality would be accounted for. Within six days after these ablutions, and the drinking the water of the Zem Zem, the streets of Mecca and its mosques, the twelve miles of road lying between the city and Mount Arafat, the valley of Muna, and the plain of Arafat were cumbered with the dead. In 1881 Professor Frankland got a sample of the water for analysis, and he says: "I have analysed this water, and find it to be of the most abominable character. In fact, it is sewage, more than seven times as concentrated as London sewage, and it contains no less than 579 grains of solid matter per gallon. Knowing the composition of this water, and the mode of propagation of Asiatic cholera by excrementitious matters, it is not to be wondered at that outbreaks of this disease should often occur among pilgrims to Mecca, while it would scarcely be possible to provide a more effective means for the distribution of cholera poison throughout Mohammedan countries." Year after year pilgrims may drink of this water with immunity, but the introduction of the specific germs, or the *materies morbi* of cholera would certainly render it a virulent poison; for there is every reason to believe that such matter is propagated in a suitable medium outside the human body.

In 1869–70, during an epidemic of cholera, there died in the city of Zanzibar, at least 10,000 out of a population of about 100,000. Two sections of the community escaped not only death but sickness, those unaffected being the Europeans resident in the town, and the Banyan population, natives of India. A considerable number of Europeans on board ship in the harbour, were attacked, and there were several deaths. During the epidemic, the ships were anchored well out, and they were not exposed to any land breeze; for the north-east monsoon was blowing strongly at the time. The local influences, atmospheric and telluric, were common to all in the city, and the houses of Banyans who escaped were mixed up and identical with the houses of the other natives of India who were attacked. The Banyans, however, in accordance with their invariable custom, used the water of their own well, which was not exposed to excremental pollution, and to which none but their own caste have access; while the Europeans living on shore used either filtered rain-water, not exposed to pollution, or water of superior quality brought from a distance of four or five miles. With the exception of an unpolluted water supply, the Banyans and Europeans had nothing whatever in common. The other natives of the city used water drawn from the town wells, which were all exposed, more or less, to foecal contaminations through soakage; while the water supplied to the shipping was drawn from a stream liable to pollution, though the pollution could not be

constant. The immunity of these two sections, however, was not complete; for each had a single death from cholera. The European who died had been drinking water from polluted sources during a long journey from the country to the town; while the Banyan who died was in the old clothes line of business, and he had been dealing in the spoils of the dead. If there is one thing more than an other as to which I am thoroughly convinced, not even excepting my own existence, it is that cholera is conveyed by man to man, not necessarily, nor even usually immediately, but mediately through excretal matter.

Pandemic waves, air-borne influences, choleraic blasts, atmospheric and telluric conditions, subtle miasms and influences, the variations in the ground-water, neither singly nor combined can account for the geographical distribution of the great cholera epidemic which prevailed in Asia, Africa, and Europe from 1864 till 1872. With steady march, it passed along lines of human intercourse, attacking the inhabitants of cities and towns who were exposed to all sorts of insanitary conditions, and also tribes whose only protection from the weather was a bullock hide for a tent, and whose only article of dress was a coating of oil or fat. It prevailed among tribes whose exclusive diet was vegetable, and among others who ate only the flesh of the bullock. Those who ate fresh meat were as liable to attack as those who ate the flesh of animals in an advanced state of decomposition. The recent outbreak of cholera at Damietta was ascribed to the pollution of the Nile from the bodies of dead cattle having been thrown into it; but how this mode of pollution could originate cholera I cannot imagine. The Wanyamuezi do not bury their dead, and they delight in putrid animal food. I have myself seen crowds of them cutting up the body of a hippopotamus in such an advanced state of decomposition that I could not stand within a hundred yards to the windward of it. The Manyuema eat their own dead, but not until the bodies are semi-putrid, and they do so with apparent immunity. In consequence of such practices, cholera never originated in the Wanyamuezi, nor in the Manyuema countries; but it reached them in the usual mode.

Preventive Measures.—The worst mode of meeting an epidemic of cholera is to wait till it reaches us and then to fight it; but the best plan is to render an epidemic of cholera impossible. This can be done with comparative ease, the only difficulty being in moving Government and our Local Authorities. The public measures for the prevention of cholera are measures equally necessary for the promotion of public health, and, I may add, for the promotion of public morality. With a pure water-supply, uncontaminated between its source and distribution, a

great outbreak in a community would be impossible. With a reasonably careful mode of excretal disposal, the risks would be greatly lessened; while, with complete cleanliness all round, solitary cases only would occur. Cleanliness, in the sanitary sense of the term, does not mean a well-washed face, a clean shirt collar, front, and cuffs, or a thoroughly dusted house; but it means the immediate removal from our dwellings, and from our surroundings, of all decomposing matter, and the immediate destruction of it, by fire, after it has been removed. The main object should be the removal of all local insanitary conditions, so as to render the increase of the *materies morbi*, or of the micro-organisms, outside the body, impossible.

In this country considerable progress has been made, during recent years, in sanitary matters, but we are still far from being perfect. We see the beneficial effects of complete sanitary organisation in our cities and large towns; but there is urgent need for extension of similar operations in our small towns and rural districts.

The actual outbreak of epidemics can only be encountered by the management of first cases of illness—by the isolation of cases, and the absolute destruction of all excretal matter. The *cordon sanitaire* and *quarantine*, can only be applied with any reasonable prospect of success to the patient in the hospital and to the family in the reception house. In order to accomplish this, not only a registration of death, but a registration of illness must be compulsory. What is necessary in Europe, is equally necessary in India, the endemic seat of cholera; but while the difficulty in carrying out such measures in this country is great, the difficulties with the native populations of India are almost insuperable. In India a distinct sanitary service, on the model of that of England, is an urgent necessity, and the entrance to that service should not be through the portals of the Indian Army. It is quite impossible for district surgeons, whose chief duties consist in the administration of jails and hospitals, and who have to attend professionally on the government officials, and who, moreover, are engaged in private practice, to attend to the sanitary supervision of a large native population, spread over an immense district. So long as people are permitted to wash their cloths and bathe in tanks from which they draw their water supply, epidemics of cholera must inevitably break out; and the greater the number of the people attacked, the greater is the probability of epidemic being widely diffused. The really important international question as to cholera, consists in an investigation as to the sanitary service of nations.

QUARANTINE.—Quarantine, in order to be effective as a preventive measure, must be complete. Where, therefore, are we to begin, and what is to be done to ensure immunity? Take Bombay, for example, or Calcutta. In the third week of April, 1883, there were 145 deaths from Cholera in Calcutta; and we may safely take for granted that there were at least 580 cases of the disease. Would such a rate of sickness and mortality render the measure of Quarantine necessary? If so, it would be necessary to blockade Calcutta by river and land until the epidemic disappeared. So, also, in regard to Bombay and all other parts of India. A sanitary question of International interest does not, or should not, be considered as affecting Europe alone. The only possible benefit that could result from a rigid system of Quarantine would be the touching of the public conscience, through the public purse. The interruptions to the commerce of India might stimulate sanitary research and sanitary reform in India, but nothing more. Egypt, and all other countries in an insanitary condition, will be swept by epidemics time after time; and it is quite proper that such should be the case. The sanitary system of the universe is perfect; and it is ever true that "the soul that sinneth it shall die." There is no certain specific for Cholera, and it is to be hoped that none will ever be discovered. Neither is there any specific, such as Quarantine, for epidemics of Cholera in any country. The only mode of protection against Cholera is to render its propagatives in a country impossible. To send sanitary experts from India to Egypt, in the recent crisis, has much the appearance of the comedy after the tragedy.

Professor F. DE CHAUMONT, M.D., F.R.S., said the statements which had been made that the recent outbreak of cholera in Egypt could in no way be traced to cases of sickness from India were quite right. The opinion had been expressed by Pettenkofer that cholera was brought from India last year by the troops belonging to the Indian army, and that the germs left by them found in Egypt a favourable field for their development. That was possible. On the other hand it had been said that the disease arose spontaneously, no special disease germ being necessary. He did not hold these views at all. With regard to the question of quarantine, it had been admitted that cholera germs were capable of being carried from place to place by human intercourse, but he held that quarantine regulations were absolutely useless as well as impracticable. These regulations interrupted business and delayed travellers without doing any good whatever. A very interesting speech was made at the recent congress at Amsterdam by a shipowner, in which the speaker pointed out the many difficulties which shipowners had to contend with, including those created by quarantine

regulations. That shipowner said it was perfectly easy in any port of the world to get quit of the annoyance caused by quarantine regulations by the payment of "bucksheesh." During the recent outbreak of cholera in Egypt, a sanitary cordon was drawn around Alexandria for the purpose of preventing trains, carrying for the most part cleanly persons, from entering the city, yet filthy Arabs were going about on foot, carrying the disease into the place. They were still in the dark on the subject of the spontaneous origin of typhoid fever and he did not believe in it himself, but great weight of evidence went to show that mere sewage did not give rise to the disease. There were many instances of people for twenty or thirty years drinking from polluted streams without their being attacked by the fever. They could only account for the spread of the disease by the fact that the poison, when once it found conditions favourable for its propagation, spread among the populace. It was, however, a happy thing that whatever views were held, all were agreed that sanitation was the fundamental point they ought to aim at, instead of futile attempts at quarantine and sanitary cordons. The drinking of impure water was favourable to the disease, but the best preventive was the removal of sewage from large centres, proper ventilation, and attention to personal cleanliness.

Mr. Jones, Madras, said he was in Madras during the last visitation of cholera. He noticed that the persons principally affected were the washermen, which showed that cholera was carried about by the clothing as well as by the person. It had also been noticed that the disease usually commenced in the north-west of India, and came down to the south-east with the pilgrims. Although these pilgrims might not be personally affected, they still carried the disease to the places they visited, and left it there. With regard to typhoid fever, they employed in Madras about 800 men in cleansing the drains, and he had never known of any of them being affected with typhoid fever. This showed that sewage had no effect with regard to the introduction of typhoid fever.

Mr. T. Harnett Harrisson, Liverpool, believed it was Dr. Snow who, in 1849, first traced clearly the spread of cholera to impure water, and from that time till 1855 a great deal of evidence was given in that direction which was collected and published by Dr. Snow. It had been proved that towns which had secured a supply of pure water escaped cholera to a large extent. The same towns having been severely visited during previous epidemics when their water supply was bad. Dirt might be regarded as the home of cholera, temporary or otherwise. The one thing needful for its spread and propagation seemed to be dirt, whether it be dirt in man, air, earth, water, or perhaps food. Perhaps its chief means of conveyance was dirt. Its line of travel was the line of travel of dirty Easterns. The fairs in India, where immense numbers of dirty people congregated and remained for some time without any sanitary provisions were the most likely places to which it would be conveyed, finding a new home and a new centre for redistribution. It seemed to be conveyed by dirty men to dirty places. He believed those who had the nursing of cholera patients, and who lived in an atmosphere arising from the profuse dejections from their bodies escaped in a wonderful way, probably because they took care that their bodies should not be dirty homes for disease.

The provisions necessary for the prevention of cholera seemed to be pretty much the same as those required for other epidemic diseases, namely cleanliness—clean men, air, earth, and water.

A friend, who was in Egypt during the recent epidemic there, told him that he had known the body of an Arab, who had died from the disease, to be dug up by his friends for the sake of the blanket that enveloped it.

Dr. Kirkwood, Largs, referred to his experience as regards cholera at Gartnavel Asylum in 1848 and 1854. The patients in the second period were warmly clad, the diet changed—the food being better, and of a nature which would not affect the bowels. They refused to admit patients altogether, so as to avoid anything like overcrowding, the house being pretty full at the time. Special attention was given to the clothing and bedding of the patients, and the dietary was altered. Nightly visitations to the domitories were made, and the ventilation and temperature noted. The precautions taken were found to be so effectual, that in 1848 there were 40 deaths, and in 1854 only 4. At neither period was there a case in the West house where private patients were lodged, all the cases being in the East Wing, which was the more general hospital.

Inspector-General Lawson held that we should be more precise in ascertaining our facts. We had got stock notions in this country, and did not alter them according to the evidence which reached us. A great deal of evidence was so mixed up with circumstances non-essential to the case that they proved neither one position nor another. Dr. Christie had alluded to the well at Mecca, which he was under the impression became soiled by the discharges of cholera patients, and thus there was a great development of cholera. He also said that the water from this well showed when analysed a quantity of foreign matter seven times in excess of London sewage. Now, it was a well-known fact in India that water containing a saline purgative would excite cholera when the tendency to that form of disease existed. As to the communication of cholera from man to man, he mentioned that in 1873 there was an epidemic of cholera in America. It started in New Orleans in February, and spread up through the valley of the Mississippi. It was regarded as Asiatic cholera, but was not preceded by the arrival of any person affected with the disease. It was supposed to be imported from Europe, in three instances in August, but on examination the evidence in each of these broke down, and certain cases appeared in New York;

but in no case did the disease spread along the coast during that year. Then in 1865 there were a number of cases at Southampton, and at Hingdon Bois, in Essex, but the evidence as to its importation was altogether wanting. With these and other facts before us, it must be admitted that cholera might arise in a locality without any personal communication whatever.

On "Typhoid Fever, its Origin and Prevention," by J. FRANCIS SUTHERLAND, M.D., Edin.

GENTLEMEN—I know of no subject which could have a greater claim upon the attention of sanitary reformers than the origin and prevention of typhoid fever. In the scope of a paper such as this I can only hope to touch the fringe of this great public question. The settlement of the etiology of the disease rests entirely with the physician and biologist of the future: the hygienic measures necessary to check its ravages, nay, even to extirpate it, belong to the medical officer of health, to the sanitary engineer, and to all who are interested in promoting the public health. As it is a disease which meets every medical man as he enters the portal of his life's work, I am here, with your permission, to express the thoughts and convictions which I entertain after several years of experience of outbreaks of this disease under widely different circumstances. I trust at this time I may be enabled to say something that may lead to the advancement of our knowledge regarding it, and may suggest useful hints to the general public who are interested in our proceedings, and who will not fail to take cognizance of the utterances that may be given forth regarding a malady which is yearly executing so much havoc in out midst. Let me endeavour to show in a few simple words—I say simple, because I have ever thought that problems fraught with so much interest to the people should be couched in language free from technicalities—the claims which typhoid fever has upon sanitary corporations and individuals. It is one of the most common of the serious ailments of civilized life. It is never out of our midst. No household at present is safe against it. I suppose I am within the mark when I say that there is scarcely a family but has felt its blighting influence. Rich and poor alike pay heavy tribute. It stands seventh as to the number of its victims on the mortality roll of this country. Within the last

twenty years in England alone, 200,000 lives have been sacrificed to it, and what is saddest of all, it makes its principal onslaught upon men and women in the prime of life, that is to say, between 15 and 30. That being the case, our modern armies pay a tribute five times greater than the civil population. While it is reckoned that from 2 to 10 per 10,000 of the civil population perish from it 10 to 30 of the military. On the Continent matters are even worse than at home. For the last eight years Paris has suffered from its ravages far beyond any city in Great Britain, no less than 1,000 per 1,000,000 of the population having succumbed to it in 1880. In St. Petersburgh the mortality is still higher, being at the rate of 1,500 per 1,000,000. But this sad picture would be incomplete were I to stop here, for every life which it destroys, ten at least have passed through the long and wearisome illness with which many of us are so familiar.

With these prefatory remarks I approach the etiology of the disease. The present is an opportune time for discussing it, whether we look at the question from the interest which should centre round itself, or from the fact that an allied disease, cholera—allied at least in the *modus propagandi*—is working havoc in Egypt, and may be introduced at any moment to our shores. Not only are they allied in so far as the spead of both is intimately associated with the bowel discharges, but also because they are both essentially filth-diseases. While medical men and sanitary reformers have been doing something towards a settlement of other diseases, we have been content to leave the mode of origin of typhoid fever, where Murchison, the most eminent authority on the continued fevers of this country—left it ten years ago. As far as I am able to judge, we are no nearer a solution now than then. In this country and in France two theories are held regarding the origin of the disease. One is that there exists a specific contagion or germ which passes from the patient only in the intestinal discharges. This germ is a living organism which seems to be harmless at the time it is expelled from the sick person's body, but in a few days under certain conditions, multiplies and acquires a virulent vitality. The gas rising up from sewers and privies often conveys the contagion into our houses, or it may reach us by drinking water polluted with sewage containing the typhoid germ: when it then is swallowed or inhaled by a suitable subject for infection it originates enteric fever in him. Budd, of Bristol, whose name will always be identified with this theory, by his facts, and by his reasoning on these facts, has forcibly argued, that it is only the sewers and cesspools which have received typhoid fever stools, which contain the typhoid germ. The great majority of investi-

gators incline to this view. Among many eminent names I may mention those of Parkes, of Gueneau de Mussy, Pasteur, Jaccoud, Cormack, Maclagan, and Corfield. The other theory will always be associated with the illustrious name of Charles Murchison. He believed that the disease originated independently of an anterior case by the decomposition of fæcal matter. In other words he showed that it was a filth-disease which arose independently of the disease which it generated. It was Murchison who proclaimed the spontaneous generation of the disease. Its supporters now include the names of Carpenter, Brouardel, Jenner, and Colin, the eminent professor at Vâl-de-Grâce. Chauffard, Trousseau, and many others believed and testified that it might arise in both ways. Trousseau's words are of immense value. He stated that "as it is frequently impossible, notwithstanding the most painstaking researches to discover the origin of the contagion, and as it is obvious that typhoid fever at some time or other had a beginning, we cannot refuse to admit the possibility of its arising spontaneously."

I wish it clearly to be understood that the great point in the contention of Murchison and others is that it was not necessary that typhoid stools should have reached and mingled with the sewage which contaminated the air we breathe, or the water we drink. Ordinary fæcal matter—filth—was quite capable of doing the mischief. With this view of the question I entirely agree. I cannot, however, believe in the spontaneous generation of germs. It must be conceded that all the phenomena of so-called spontaneous generation yet observed are to be explained by the presence of living germs in the air, and that Redi's dictum, *omne vivum ex vivo*, still remains uncontroverted. Thus far I am at one with those who believe that typhoid may originate from sewage *per se;* but I go much further and maintain that no specific germ is necessary for the production of this disease.

Let me explain how I have arrived at this conclusion; and in doing so permit me to say that although I hold such decided views, yet I entertain the most profound respect for the views of the eminent men who think otherwise. I have tried to reconcile my experience with the two theories most commonly entertained, but have failed. The supporters of the specific origin believe that the disease is due to a specific germ, or minute living organism which microscopists with powerful lenses may yet be able to demonstrate in the blood or intestinal glands of typhoid patients, and which biologists may yet be able to cultivate and reduce to a state of comparative innocuousness. This is a pleasing prospect, but I am by no means sanguine we shall see it, hopeful, rather in the belief that, as it arises from the

germs of fæcal pollution, it will be as thoroughly eradicated from our midst as the black plague of the Middle Ages. But if the view is to be maintained that entirely (for there are many sanitarians who support that theory) or in great measure, that typhoid fever can only arise from its specific predecessor, whose genealogical history sanitary science has failed to trace, then all we can hope for is to minimise by cultivation of the poison, or, what I prefer, by a system of personal, domestic, and public hygiene, the disastrous effects of this as of any other social scourge.

The memories of cholera which, during its last visit to our shores in 1848-49, carried off 80,000, sends a thrill through the country, and yet from typhoid alone 13,000 have died on an average during the last 20 years, or from the combined diseases so intimately associated with filth, 20,000, and little is really heard or said about it. The theory that typhoid is only begotton of typhoid—in other words, that it must have a lineal descent—reminds one very forcibly of another fashionable theory where the connecting link to prove it, was wanting. It is really matter for surprise if one and the same disease can be created by means so diametrically opposite as the specific germ known as the *bacillus typhosus*, and the non-specific germ of filth. Either the one or other must be true? Until the typhoid germ has been demonstrated, and experiments made on the lower animals free from the fallacies which surround those already made, I must abide by the belief that it is due to a non-specific germ, which I may be allowed to designate the *sewage per se* germ. This germ or microbe has also a history. It is admitted that ordinary fæcal matter which passes throuh sewers, or remains in stagnant cesspools undergoes fermentation and decomposition, not only by the action of ammoniacal urine, but also by the action of the atmosphere itself. Chemical changes take place: living organisms are produced in great abundance—call them by what name you choose. Whether the living organisms, which are the cause of typhoid, found in the bowel discharges were originally there, and have in the course of decomposition altered their character and multiplied, or whether they are atmospheric germs which have gained access to the sewage, and in this new medium changed their character, is immaterial. These germs abound in sewers, cesspools, and privies. They reach our bodies by the air we breathe or the water we drink. I make no mention of milk, as it is now an established fact that poison germs gain access to this fluid in dairies where the vessels are washed, or the milk diluted by the poison-charged water. In the human system they find a medium in which not only do they multiply, but become virulent and produce those well

marked clinical symptoms so characteristic of typhoid fever. After having done their work, and played themselves out, if I may be allowed to use the expression, they are expelled from the body by the bowel in a different, and to all appearances an innocuous form. The harmlessness of the expelled germ is attested by the highest authorities. Let the bowel discharges of a tyhoid patient, however, gain access to a medium where fermentation and decomposition will rapidly ensue, and then by inhaling or swallowing the poison the disease is again established.

If other proof is wanted of the harmlessness of the fresh evacuations it is to be found in the recorded statement that 5,144 patients were treated in general wards with 3,555 cases of enteric fever, and none took the disease. I am prepared, however, to admit that typhoid evacuations are nearer that state of decomposition when they become dangerous, than the ordinary bowel discharges. But in both instances chemical changes and the air laden with its own freight of organised matter, set up fermentation and decomposition. In the one the germs, although abundant, are innocuous: in the other they have lost their power only to regain it more rapidly. As Murchison puts it, the history of many epidemics in country districts, of isolated cases confined to single houses, prove that it is often impossible to attribute the first appearance of the disease to contagion. He says, "it is not uncommon for the inmates of an isolated country house to be seized with enteric fever although no case has occurred within many miles, and there is no evidence of the importation of the disease." My own experience of the disease in public institutions and in private practice in this country and in Paris, where it may be said to be endemic, confirms the view Murchison put forward with so much force. Briefly it is as follows:—

It is needless to occupy your time giving all the details of these outbreaks. The time at my disposal is too brief, and, besides, I am not sure that to do so would be profitable. The first two outbreaks of which I had experience occurred in Fifeshire, one in the country and the other in a village with 2000 inhabitants. In this village typhoid was not known for twenty years previous to this epidemic. In all 70 people were affected, and 7 died. In both instances it was clearly shown by qualitative and quantitative analyses that the drinking water from two wells was contaminated for some time by sewage escaping from the sewers and soaking through the intervening soil into them. I have known emanations from decomposing fæcal matters continuing for months to cause an outbreak of diarrhœa, and one case of typhoid in the apartment next the source of the evil. In none of the outbreaks was there a particle of evidence to indicate that typhoid matter, either from a typical or masked case, had reached the sewage. Human observations are fallible: mine must be taken at their worth. During a prolonged residence in Paris, I had considerable opportunities of observing this disease, but perhaps in no city would it be more difficult to ascertain how the disease originated and how it was propagated. The water supply, which was far from good, may be excluded. We must look to the inhalations from sewers, cesspits, &c., and the miasms emanating from the *fosses permanentes*, and from ordure accumulating in dry-soil pipes. It was the existence in Paris of these polluted sources that led Brouardel and others to adopt the views of Charles Murchison. Many of those whom I have the honour to address can speak from a longer experience than I can—an experience which has led them to take another view of the matter. But these are the elements—precise, so far as I am able to judge—which I bring in support of the theory I have put forward as a contribution towards the ultimate solution of this grave question of public health. When the question was one of specificity *versus* spontaneous generation, we were reminded by eminent sanitarians at home and abroad, that the adoption of the latter theory destroyed the hope manifested by Budd and others of our being able to exterminate this national scourge. They significantly say "that if typhoid arises spontaneously, if we engender it in ourselves, if it arises from all the conditions, social and necessary, which surround us, we are deluding ourselves by chimeras in thinking that it will now disappear from our midst." I am not sure if this is true of spontaneous generation, for which a foul medium is necessary, but I may safely say it does not apply to the sewage or filth *per se* germ, which neither paralyses hygiene nor discourages research. The adoption of this view is most hopeful for sanitation.

I anticipate the objections that may be urged against these as instances of typhoid arising from sewage *per se*. I may be told, that the smallest quantity of typhoid evacuations may have reached the contents of sewers, cesspools, or privies, if not from a well-marked case of the disease, from a masked or ambulent case, or in some other mysterious way.

Nothing is easier than to throw doubt upon investigations carefully made with no other view than the elucidation of truth. Fortunately, however, for those who believe in the non-specific origin of the disease, similar doubts may be thrown upon the researches of those who never fail to find a trace of typhoid sewage in places where outbreaks occur. It may have been there from remote or recent date. The *crux* of the typhoid problem is undoubtedly the genesis of the germ. My

own conviction is, that it only arises from the decomposition of fæcal matter to which typhoid bowel discharges may, or may not have gained access. In short, typhoid discharges are not essential to its production. In the future, in a manner which I shall shortly indicate, it will be possible to prevent in towns and cities sewer gases from gaining access to our houses; in villages and the country districts filth heaps from becoming a nuisance from proximity to dwellings; and to preserve our water supplies from all sources of contamination. It may be said with almost absolute certainty, that the individual who contracts typhoid is *ipso facto* demonstrated, to have been exposed to excremental pollution of air or water.

Unanimity of opinion as to the origin of this disease I do not anticipate, but as to the hygienic measures to be adopted for its prevention I may assume we are at one. The figures already mentioned in your hearing have an importance other than to demonstrate the prevalence of typhoid fever. They shew very clearly what sanitation has already done, and may yet do for the health and well-being of this country. Going back over the Registrar General's Reports for the past twenty years I find that over a quarter of a million have died in the three kingdoms from typhoid fever alone, and nearly 400,000 from all the filth diseases, viz., typhoid, typhus, diphtheria, and a percentage of diarrhœa.

But this is not all we may glean from these mortality reports. They form an accurate starting point from which we may calculate approximately the number who have been ill, and recovered from these diseases. And what do we find? We find that for every death from typhoid ten have been ill, and for every death from the other three filth diseases seven. In other words, in the three kingdoms, from 1861—1880, 2,500,000 have been ill from typhoid alone, and 1,700,000 from typhus, diphtheria and diarrhœa. If instead of twenty years, we take one year, we see that 12,500 have died from typhoid, and 125,000 have been ill and laid aside from work for a period little short of three months. These are startling figures. All this means enormous loss to the communities in which typhoid is endemic, or epidemic—a loss which would have paid not only handsome interest on all the capital raised by sanitary boards, but also part of the capital itself. This loss I have computed from typhoid alone during the twenty years at £23,300,000, and from all the filth producing diseases (including typhoid) at £29,500,000. Thus you see, typhoid is *primâ facie* the disease of the future, which, whether we look at it from the pecuniary loss we suffer, or from the heavy tribute we pay in life, must receive the attention of sanitary reformers.

I have already shown by a method of calculation, which I shall now explain with the aid of a table, that this heavy mortality and sickness means a loss to the country of nearly £30,000,000 in the period selected.

Filth Diseases.	Proportion of deaths to number ill.	Average No. of days ill of those who died.	Average No. of days ill of those who recover.
Typhoid	1 in 10	20	90
Typhus	1 in 5	14	30
Diphtheria	1 in 6	10	30
*Diarrhœa	1 in 10	10	30

In the case of typhoid I have assumed that for every death 10 are ill, typhus 1 in 5, diphtheria 1 in 6, and diarrhœa (that per centage—20°/₀—due to sewer gases and foul emanations) 1 in 10; that those who ultimately die from typhoid, have lived on an average for 20 days, and that those who recover are laid aside from duty for three months. The funeral expenses I estimate at £5, and each day's loss of labour at the minimum of 2s. The same method of calculation applies to the other filth diseases, but the table *supra* explains all that is necessary for the purpose I have in view. With these brief explanations I leave all the filth produced diseases save typhoid, which more than any other furnishes an interesting commentary on the value of sanitation. My object with regard to it will be best illustrated by taking the history of typhoid in England during the last twenty years. Its victims in this period have been more than 200,000, but while during the decennial period, 1861-1870 the deaths were nearly 19,000 per annum, during the decade 1871-1880, the annual mortality fell to 7,800. And moreover, this fall has been in a steady and progressive ratio. To put the matter in another way, 398 of every million of the population died in 1869, whereas in 1880 only 261 per million. The splendid results achieved by sanitation will be seen even better, if instead of taking the whole of England we take individual communities. A few will suffice to serve my purpose.

* 400,000 have died from this disease between 1860—1880. Making allowance for the large percentage due to catarrhal enteritis, and the still larger percentage due to infantile diarrhœa (over 58 °/₀), I attribute 20 °/₀ to filth.

TOWN.	Deaths per million before Sanitary works.	Deaths per million after Sanitary works.	TOWN.	Deaths per million before Sanitary works.	Deaths per million after Sanitary works.
Bristol	1000	650	Edinburgh	540	326
Leicester	1460	770	Glasgow	1240	435
Croydon	1500	350	Dantzig	700	74
Merthyr-Tydvil ...	2100	860			

	1869.		1870.		1871.		1872.		1873.		1874.		1875.	
	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.
England..	8650	398	8731	392	8461	375	8741	382	8793	378	8861	377	8913	372
Paris.....	993	534	.....	.....	.....	.....	938	490	952	492	823	421	1048	532
Dantzig..	.....	.....	.....	.....	.....	.....	.....	700	.....	400	.....	500	.....	320

	1876.		1877.		1878.		1879.		1880.		1881.	
	Total Deaths.	Deaths per mill.	Tota Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.	Total Deaths.	Deaths per mill.
England..	7550	311	6879	279	7652	307	5860	232	6710	261	.....	.....
Paris.....	2032	1022	1201	589	857	411	1100	516	2120	973	2133	958
Dantzig ..	.....	250	.....	250	.....	180	.....	170	.....	74	.....	.....

With Paris, and many other cities where sanitation is in a backward state, it is otherwise. A glance at the table shows that the mean mortality per million in Paris in 1869–74 was 484; from 1875–81, 714 per million. The cause is not far to seek. Paris is in an unsanitary condition from the foul smells emanating from the sewers, from the *fosses permanentes*, from cisterns and cesspits, and from the ordure accumulating in dry soil-pipes. I know of no instance in this country where works of sanitation have been executed where the public health was not vastly improved. The carrying out of sanitary works means a heavy burden on communities. Money levied for the maintenance of the public health is money saved, not misspent; for not only is much misery and destitution averted, but valuable lives are preserved. Let me illustrate the truth of this statement by citing the city we meet in, with its population (674,000) only exceeded in this country by that of London. From 1861–1880 I believe nearly 6,000 persons have died from typhoid fever, which, from the calculations already made, would mean a loss to this community of £600,000, or from all the filth diseases £800,000. I do not say this sum would cover all that has been

spent in sanitary works in this city; but it would surely cover something more than the interest of capital thus invested.

The money loss is not for one moment to be compared with the loss of human life. But these matters must be put at a commercial value before they are rightly appreciated. There have been occasions when our governing bodies have been slow to spend money which would benefit the public health. I say this, not because I undervalue the great and good work done in this and other cities by men who have gone in heartily for sanitary measures, and these improvement schemes which, to a large extent, have demolished those fever-dens which were the favourite breeding beds of every filth disease. If a remedy is not provided for the prevention of typhoid and allied diseases, provision has to be made for the maintenance of the stricken poor in special and general hospitals and in poorhouses. It may be true that the number of typhoids who enter these institutions are a mere bagatelle, probably not more than one-sixth of all the zymotics. Let it not be forgotten, however, that the illness resulting from typhoid fever means a longer residence in hospital than any of the others; not only so, but the outbreak of this disease among the lower grades of society leads to pauperism and prolonged hardships, such as we can but faintly conceive.

Who are to blame for the defects in our sanitary system which lead to such diseases as typhoid, &c.? Public health acts have been enacted at long intervals, and these have failed to cope with the exigencies of our civilization. Sanitary reformers have proclaimed again and again the urgency of reform, but a deaf ear is turned to them, and it is only when the powerful voice of epidemics speaks that the necessity for some radical changes is apparent. Sanitary legislation may have come tardily and piecemeal, but we are not yet in that position when we can say that personal and domestic hygiene has reached that stage of perfection entitling us to think that sanitary authorities alone have failed in their duty. Communities with a pure and abundant water supply have no excuse for the neglect of the elementary laws of health. Personal and domestic cleanliness are matters which no laws can enforce. These must be left to higher conceptions of purity, engendered by educating and civilizing influences. What, then, are the changes needed in our sanitary codes which will be efficacious in extirpating this malady? The time at my disposal will only permit me to refer to these briefly. In their nature they will differ somewhat, as we have to deal with urban and rural communities—in the main they should agree. It has been demonstrated as clear as noonday that typhoid fever is intimately connected with sewers, privies, and cesspools. The bowel discharges gaining access to

the water we drink or the atmosphere we breathe vitiate them. All legislation, to be effectual, must put an end, as far as possible, to the possibility of these pollutions taking place. The sanitary area must be enlarged by adopting the county or combination of counties as the unit area of administration. All sanitary matters must in future be managed by a central authority composed of men duly qualified for the work. These are general matters; but specially there must be a thorough reform of what have been termed building regulations. These have reference to house construction, house drainage, size of rooms, and cubic space per head. Provision has already been made with reference to the laying out of streets, to sewerage and water supply, but, so far as I am aware, none with reference to the amount of free space within and around tenements, to house drainage, size of rooms, &c. The first flooring of a house should not be laid until the soil pipes and their connections with the closet and the sewer have been duly inspected and certified. As the laws at present stand, speculators in house property have it all their own way. They are free to build precisely as they choose, with the result that every inch of ground in some parts of our cities are covered with buildings. If there is one maxim in sanitary science truer than another it is this, that death-rate and density of population advance *pari passu*. For a long time we were in the dark as to the insanitary state of our house. But the dawn of sanitary science has arisen. Medical officers of health and sanitary engineers have with their limited powers been showing us how we may be living in an atmosphere fouled with the vilest gases and other poisonous germs. Sanitary protection associations have been established all over the country. Their reports, which I have been enabled to read, make the startling announcement that 80 per cent. of our houses are in an insanitary condition. It is only when typhoid has appeared and done its deadly work that the defects are ascertained and remedied. You are familiar with these reports. They carry the same sad tale. They run thus: "drains with insufficient fall-joints open—work scamped—trapping arrangements defective—connection established between water and soil-pipes—ventilator of soil-pipes appearing near bedroom windows." Such a condition of things is not confined to the tenement, but may be seen in the palace. Many a mansion-house, beautiful for situation, has had to be gutted to discover how the filth germs which beget typhoid reached the inmates. The primary inspection of pipes, joints, and traps, would not be all. There must be periodical examinations; and to carry this out the pipes, &c., must be laid in such a way as to admit of easy inspection.

The number of rooms in a house, and the number of persons to a room is important. One who has traversed the recent census statistics tells us the sad story that more than 40 per cent. of our great city populations live in one room. Surely this should not be in a country with an Artisans Dwellings Act, and where the Peabody bequest has demonstrated that comfortable dwellings may be constructed for the poorer classes who suffer from the ravages of typhoid. Not that I believe that the inmates of one-roomed houses are more exposed to the poison germs which produce typhoid than others, for I find the medical officer of this city has shown that such is not the case. In one-roomed houses w.c's should not be allowed to exist. And yet there are such houses. Building societies have shown that suitable and healthy dwellings may be provided for the poor and no one be a loser.

I now come to cubic space. It has an important bearing on typhoid. It is a matter the proprietory interest must not be allowed to settle as they choose. The amount at present allowed is utterly inadequate. While prison, poorhouse, and asylum managers have been constructing, with the aid of the public purse, institutions where 800 and 1,000 cubic feet are allowed per head, yet municipal authorities know that there are hundreds of fever dens still in large cities where there is not 150 cubic feet per head. Redress cannot come too soon. Public opinion is now prepared to endorse the remedies suggested by experts, no matter what the sacred rights of property may be. But in the light of present knowledge human life must be considered far and above these. Never was a clearer connection between cause and effect made out than that the thousands who die, or are ill and recover, perish or are ill from a water supply fæcally polluted and from defective sanitary arrangements. At present we have to wait until typhoid or diptheria makes its appearance before steps are taken to ascertain the cause. Since it has been shown that the milk supply from the country may be the bearer of disease germs, another weak point has been discovered in our Public Health Acts. These weaknesses demonstrate very forcibly the necessity for one code of sanitary laws and one kind of authority for urban and rural districts.

The last matter to which I shall refer is the existence of a hospital in the sanitary districts to be created, and the treatment there of all cases of the disease which cannot with safety to the public health be treated in their own homes. All these reforms briefly alluded to will have to be carried through before typhoid is stamped out. You have seen by the figures I have brought under your notice what city improvements, a good water supply, &c., have brought about. And shall we cease our

endeavour to obtain sanitary reform until typhoid is relegated to the place which its supposed predecessor-pest occupies? a place in sanitary history, as a beacon to warn this and future generations that such infringements of the laws of health as take place before this fever breaks out, is mercilessly punished with disease and shortness of days.

In conclusion let me say that if my beliefs do not coincide with the ideas and doctrines of the eminent men whom I have the honour to address respecting the origin and prevention of typhoid fever, I have too much confidence in the liberality of your opinions not to submit for your impartial consideration my doubts and reservations, hopeful that whatever your verdict may be, it will conduce to the public weal.

Dr. Macgown, Millport, said that his idea decidedly was that typhoid fever could arise *de novo*. If there was a well with contamination entering it long enough from a dungstead near at hand, there would soon be typhoid fever amongst people who partook of the water directly or indirectly. Seven years ago he dealt with an epidemic of typhoid, and he traced it to an impure well. Whenever that source was cut off the epidemic stopped. In all these epidemics in country districts it was found that the disease had its source in a well, into which ran the liquid from an adjacent dungstead. Frequently the water found its way into the milk, which in its turn reached towns or villages, and the result was typhoid fever.

Prof. de Chaumont, M.D., F.R.S., thought it was an accepted opinion that the germs get into the water; referring to Dr. Sutherland's observations upon the prevalence of fever in the army as compared with that disease in the civilian population, said that in former days the two great diseases which killed our soldiers at home were consumption and typhoid fever. Now he was happy to say that both diseases had been so far coped with in the army that the rate of mortality from consumption was below the average rate amongst the civilian population, and the typhoid fever rate in the army was greatly below that of civilians of the same age.

Dr. Sutherland, in reply, regretted that the point in his paper had not been quite apprehended. He did not say he was a supportet of the *de novo* theory. He thought he had stated clearly enough thar he did not believe in the spontaneous generation of germs. The point of his paper was this, that collections of fæcal matter, with or without typhoid discharges, held germs in their midst, and as decomposition progressed these germs altered their form and character, and, provided at a certain stage of change they by the usual channels reached

our bodies, where they multiplied rapidly, typhoid fever was established. All fæcal matter contained germs dangerous at a certain period of their history. Surely no one present was sanguine enough to believe that the Home Secretary would allow him to make the necessary experiments upon animals to verify the conclusion arrived at after an investigation into outbreaks; but when the false sentiments which now prevailed had passed away, he hoped to be able to make those experiments.

On "The Disabilities of Inspectors of Nuisances, and their Remedy," by E. C. Robins, F.S.A., F.R.I.B.A.

I was recently desired to take the chair at the establishment of a new Society, to be called "The Association of Public Sanitary Inspectors," and I acceded to the request because I have long felt that the labours of that very useful body of men—better known as "Inspectors of Nuisances," are too often handicapped by conditions very unfavourable to the satisfactory discharge of their duties.

And it has occurred to me that it might not be otherwise than useful if I were to embrace the opportunity which the holding of this year's Congress of the Sanitary Institute of Great Britain, at so important a centre as the City of Glasgow, provides for the ventilation of the subject.

The duties which devolve on these public officers are of a nature to bring them not only into contact, but also into antagonism, with their employers; and influences are brought to bear upon them which render it often a very unpleasant and ungracious duty to put in force the provisions of an Act designed for the public benefit, but opposed to the personal and private interests of parishioners, many of whom are members of the Vestry, Guardians of the Poor, or sit on Local Boards of Health in the district.

The support which the inspectors have a right to expect from their superior officers, such as the parish surveyors and medical officers of health, is oftentimes grudgingly given, or absolutely withheld, in cases where influential members of the local authority are concerned.

Medical officers have over and over again pleaded their inability to carry out the improvements they desire, because they are not made sufficiently independent of their employers, many of whom are also their private clients.

Earnest men, anxious to do good work, become *marked* men,

and are looked upon as meddling and officious persons, so that, unless a grievance is brought to the notice of the officer in the ordinary form of a complaint, he hesitates to report the existence of nuisances which it is of great importance to the public health should be remedied at the earliest stage of their conception.

In short, the preventive measures which it is so important to institute prior to the breaking out of a disease, are postponed till the disease itself has appeared, and thus remedial measures are resorted to when too late to prevent their necessity.

Periodical house to house inspections are essential to the due performance of the duties of an officer of health, or inspector of nuisances, in the neglected portions of his charge.

I am aware that the extent of the areas under the supervision of one inspector is oftentimes too large and unmanageable for him to do more than attend to the complaints made, and little time is available for what he would consider supererogatory labours; and until the public understand the importance of these labours, they will not deem it desirable to augment the staff of such assistants.

But it is penny-wise and pound foolish to act with parsimony in the matter of the preservation of the public health, the loss of which entails upon the parish such heavy responsibility and expense, especially in times of epidemic disease, and so largely increases the pauperism of the lowest classes, and the consequent burdens of the ratepayers.

The preservation of the purity of the drinking water; the provision of a sufficient supply for cleansing purposes; the regulation of the drainage, and the rapid removal of excreta, and proper ventilation of the system adopted; the removal of refuse and accumulated vegetable and other matters in private houses, manufacturies, slaughter-houses and dairies; the prevention of over-crowding and use of insanitary dwellings and marshy surroundings; the obstruction to the sale of unsound meat and other food, &c., &c., are all matters of vital interest to every member of the community. For, as a late divine observed:—

"Everything that tends to promote the welfare of the poorer classes, tends to the stability of the noble institutions of this country. He that connives at, and disregards the suffering, misery, and degradation of his neighbours, will not escape with impunity, for what he leaves to breed pestilence in the dark alley will arise and reach him in the grand square, and show the rich that they are never safe as long as they neglect their duties to the poor.

"The sanitary question was second only to the educational; air, water, and cleanliness have much to do with the moral condition of our country."

The vested interests of owners of inferior house property oftentimes stand in the way of public improvements of a sanitary character, because such owners have not yet learnt the increment of value which appertains to sanitary dwellings.

And vestrymen, as a rule, own a considerable part of such property, and therefore think themselves aggrieved if the parish officers exercise too indescriminate and impartial a supervision of it, and consequent readiness to report unfavourably upon it.

How is this to be met? By the bringing to bear thereon the force of *public opinion*.

But how is this to be done? I will give you an instance of how it *was* done in the year 1853, by a private society of which I took the management, and published the result of our labours in 1854, in the form of a pamphlet entitled, "A Practical View of the Sanitary Question."

This Society was established by the Incumbent of a church in the metropolis, who associated the leading men in his congregation to form a Local Board of observation, by whom a house-to-house visitation was instituted. The paid inspector reported to me, as Hon. Architect, the state of every house in the district, and I served notices in the following form:—

"I herewith give you notice of a nuisance existing on your premises, viz., (description of the nuisance.) And I hereby require you to remove the same in accordance with the provisions of the Nuisances Removal and Diseases Prevention Act."

In short, though possessed of no positive legal authority, our moral force was found to be sufficient. We made it our business to require what the spirit of the law required, and in the event of opposition we had only to point to the Sanitary Acts of Parliament and threaten to place the case into the hands of the legally constituted parish authorities, requiring them to put in force the powers with which they are entrusted for the protection of the public health.

Our experience proved that the majority of householders were more willing to accede to the mild representation of the requirements of the law made by the Board, than to brave the interference of the strong arm of the law itself, which constituted the reserve artillery, which the Board did not find necessary to bring into action in so many as half a dozen cases out of 93 landlords with whom the Board had occasion to deal.

Mr. Tom Taylor, Secretary to the General Board of Health, writing to me on the 12th of June, 1854, says:—

"If the constituted local authorities, whether in the Metropolis, or in other cities and towns throughout the country, were generally actuated by the same zeal, and guided by the same intelligence in the exercise of the powers for sanitary improve-

ment which the law has vested in them, as have inspired and regulated the purely voluntary and unofficial efforts of the Local Board of Health for the Regent Square District, I am to express the belief of this Board that it would be seen that, however defective may be the laws for the protection of the public health, it is the will and knowledge to put those laws in force that are most needed to effect the removal from amongst the dwellers in our towns, of the principal sources of premature death and preventible mortality."

As a matter of fact, the result of a single year's unofficial work in one small corner of the immense Parish of St. Pancras was that "1017 separate sources of infection were abolished, 4,000 cubic feet of fæcal matter were removed, and 6,180 lineal feet of foul house drains were cleansed or renewed."

I have not learnt what was done by the parish inspectors of nuisances during that year, but since our district was but the 280th part of the Metropolis, if similar philanthropic boards of health had been established throughout London, no less than 284,760 separate sources of infection would have been abolished, 1,000,000 cubic feet of fæcal matter removed and 328 miles of foul house drains renewed or cleansed.

The following is an extract from the Report of Dr. Sutherland on Epidemic Cholera in the Metropolis, 1854, as published in the Blue Books, and is therefore an official approval or endorsement of the plan of operations adopted by us:—

"It was not considered necessary at that time (September, 1854,) to institute any inquiry by inspection within the City of London, or in the large Parishes of St. Pancras or Marylebone, because the epidemic had visited them with comparative lightness; and, moreover, the President had reason to be satisfied with the activity of the Local Authorities, and with the proceedings taken by the Local Sanitary Committees.

"The voluntary exertions of the Local Board of Health of Regent Square Church district St. Pancras, headed by the incumbent, are worthy of the highest commendation, as affording an example of how much good may be accomplished, even in the present defective state of the law, by vigilance and well-directed effort."

The "Practical View" also contained a plan of the district, and a list of the owners of the property incriminated, and the works required in each case to be done, which extended to 211 separate houses, but no less than 2,491 primary and supplementary inspections were made, and 172 notices served on 93 different landlords, many of whom were vestrymen.

And now what is my *moral?* What is my remedy for the apathy of the public? My specific for quickening the consciences of owners? My suggestion for the support of these public officers to whose disabilities I have referred?

Why, simply this. Let the energetic few in every district, in every parish, take the matter to heart, and forthwith establish a private society such as that the success of which I have described. Let their honorary, self-sacrificing labours for the benefit of all exercise its moral influence on the rest, and let their house to house inspection result in drawing the attention of owners to the insanitary state of their premises, and they will achieve a greater saving of life than will ever take place by the action of the auxiliary forces, the so-called volunteers.

Let us establish a sanitary, life saving, health giving volunteer movement, and let the officers of the parish authorities feel that they are supported in their arduous and unthankful labours by the public sympathy which such institutions will prove, and we shall hear no more of the unrighteous use, made by the powers that be, of the influence they possess to the discouragement of honest, earnest, and capable public sanitary inspectors.

Since writing the above my attention has been called to a letter on behalf of working men addressed to the papers by Miss Toynbee (daughter of the late celebrated and self-sacrificing aurist) who is the hon. secretary of a society just established, entitled the "*West Marylebone Sanitary Aid Committee.*" In this letter the urgent need of applying sanitary principles to the homes of the poor, is very ably enforced, together with the fact that the agencies at present existing do not achieve the desired result.

Neither the "Sanitary Protection Association" nor the "Sanitary Assurance Association" has succeeded in reaching the homes of the working classes. The co-operative principle upon which these philanthropic societies are based, has reduced professional fees to a minimum, without inducing owners of small properties to become members. The parish authorities only attend to cases brought before them, and the poor, not being owners of the property they occupy, find difficulty in getting their homes made healthy, but the "Sanitary Aid Committee" referred to, have pledged themselves to undertake the investigation of complaints *made to it* by district visitors, clergymen, or the tenents themselves, and to report them to the parish authorities. It has not yet ventured upon a house to house visitation, but doubtless this will follow, the St. Pancras example, before described, having proved that one system is not more likely to give offence than the other.

The Marylebone plan has, however, the advantage of lessening the outgoing expenses of the committee, the parish officers alone being employed, instead of the independent and specially paid

inspector, directed by an achitect or surveyor, who might not always be found both able and willing to act in an honorary capacity, consequently I deem this most recent local effort of sufficient importance to warrant my pressing it as an example upon the attention of the philanthropic public, the extreme simplicity of its organization being its best recommendation.

In conclusion, I may state that there are other disabilities of Inspectors of Nuisances, some of which have been summarized by one of their number as follows:—

"We get no credit for work well done, because—

1st. We are not districted;
2nd. We never make direct reports to the Board;
3rd. Our names are never mentioned in the annual reports of the Medical Officers of Health."

Doubtless the work done by the Inspectors has not received much direct acknowledgment, and this is a discouragement. But in connection with the new "Association of Public Sanitary Inspectors," opportunities will occur not only for stating their grievances, but of popularizing their work.

The Sanitary Institute of Great Britain has established an examination for testing the technical qualifications of junior officials, and if the new society encourages the rising candidates for such offices to obtain this certificate, it will do much towards establishing a more liberal recognition of their merits in these days of competitive examination for official positions of any kind. It may also encourage the Sanitary Institute to admit public inspectors of many years standing and approved capacity to their associate class of members, without examination, being full members of the Association of Public Sanitary Inspectors. The objects of which association are thus defined:—

"1st. The promotion and interchange among its members of that species of knowledge and practice which falls within the department of an inspector engaged in carrying out the duties imposed upon him by the Public Health, Local Government and other sanitary Acts of Parliament.

"2nd. The general promotion of the objects of sanitary science in connection therewith."

Dr. Naismith, Ayr, wished to say a few words on the condition of sanitary inspectors in the smaller provincial towns in Scotland. Undoubtedly in the larger cities—such as Edinburgh and Glasgow—sanitary inspection was satisfactory. There the inspectors were under no local influence to speak of—at any rate of a personal nature

—and they were so far independent, and more or less completely under the control of the medical officer. It was otherwise in their smaller towns—he spoke of towns with a population numbering from ten, fifteen, twenty, or even thirty thousand. The medical officer in such places was undoubtedly usually a good man. He had under him perhaps, two—sometimes only one—inspectors of nuisances. These men were usually natives of the place, and although they might be excellent men otherwise, they were generally only half trained as sanitary officers, and were hardly men suited for towns of the size he spoke of. Again, the sanitary inspector was very often allowed to engage in some other occupation. He might be allowed to collect gas rents and act as School Board officer as well, in which case he would be opening the doors of refractory parents and children with one hand and opening the door of an infected dwelling with the other. He was also undoubtedly very much under local influence, and he was too much under the authority of the Sanitary Committee of the town. The inspector was not, he took it, sufficiently under the control of the parochial medical officer, under whose eyes he was directly employed, and whose instructions it was his duty to follow. The speaker thought they should have inspectors specially trained, who would be procurable from the staffs taught in our large cities, and who should certainly not be allowed to engage in any other occupation. The inspector should also be removed from all other direct authority except that of the parochial medical officer, who was his chief. If these things were not done he thought that towns of the size he had referred to would be heavily handicapped, and not only so, but the men employed in sanitary inspection would be handicapped also.

Dr. Simpson, Aberdeen, endorsed the views put before the meeting by Mr. Robins. The grievance, he said, might be worse in the smaller burghs, but he believed it also applied to the larger towns. He considered that sanitary inspectors should be under the Board of Supervision, and be responsible only to that body. Medical officers of health, he thought, should also be placed in the same position. Those in the larger towns were, no doubt, more independent, but those who were in private practice could not do their duty while there were large proprietors probably patients of theirs. He hoped that in any new bill which would be brought in for the amendment of the Public Health (Scotland) Act medical officers of health and sanitary inspectors would be placed under the control of the Board of Supervision, and not be removable without their sanction.

Mr. T. Harnett Harrisson, Liverpool, said that in one borough he knew of, jobbery was the great paralyser of the Public Health Act. In the borough he had in his mind the chairman of the Board of Health was the largest estate agent in the place, and the vice-chairman of the same Board was the second largest estate agent, so that the two chief masters of the man employed to carry out the Public Health Act were under the pressure that was likely to be exercised

upon them. This evil, he knew, existed to a large extent in many other boroughs. On the other hand, he was sorry to say that he had known such a thing as the Public Health Act being paralysed by the purchase by an interested person of the sense of smell of the inspector of nuisances for half-a-guinea.

On "The Sanitary Condition of Glasgow, and the means of Improving that Condition," by G. W. Muir.

The health of Glasgow has for some time been unsatisfactory, notwithstanding the great expenditure of money in attempting to improve its condition. Glasgow is known over the world as a great centre of industry and trade. Were it to be made more healthy it probably would become as well known as an agreeable place of residence, for it is well built, well situated, and possesses great educational facilities, a matter of some importance to parents having sons to educate and place out in the world. It must be distressing to the authorities to find that the city under their charge compares unfavourably, in point of health, with other centres of population, and with other places in the immediate neighbourhood. At the time the deaths in Glasgow were at the rate of 25 per 1000 per annum, the rate in Edinburgh and in the suburban burghs to the west and south of Glasgow, did not exceed two-thirds of the rate in Glasgow. It is not easy for an outsider who has not access to the register, to account for this state of matters. The death-rate is stated for the whole city, and while the numbers at different ages are given, the airy west and the smoky east are slumped together.

Some part of the unusual mortality, it was said, might be ascribed to the east wind, but this, it was found, could not be the case, seeing that the rate in the neighbourhoods equally exposed to the east wind, and in Edinburgh, where that wind is notorious for its severity, the mortality was so greatly less than in this city. The Venerable Sir James Watson—at one time Lord Provost—did much to make it believed that the great Improvement scheme had been successful, both financially and sanitarily. Time has shown that, in both respects, it has been a failure. The cost to the ratepayers is many thousand —probably half a million—pounds. The only persons who benefitted financially were the owners of the old property purchased, the buyers of sites from the Commissioners have, most in nearly all cases, lost heavily by the investment. In many

cases, the rents drawn from the new tenements are not sufficient to pay the ground rent. I have no hesitation whatever in saying that, so far as health is concerned, a better result would have been attained by the preservation of the old buildings, coupled with more attention to cleanliness.

Although the sanitary condition of towns is dependent greatly on other causes than draining and cleansing, yet I understand that a sanitary institute does not entertain the consideration of any other causes. I will, therefore, confine my further observations to draining and cleansing, and the means by which those may be secured in greater perfection than they hitherto have been. I may, however,—in fact, I must, otherwise the consideration of the subject would be incomplete,—notice the state of the Statute Law, and the amendments required to secure greater efficiency.

As regards house-drains, recent inspection has shown that the houses in some of the best parts of the city are in the worst state. The application of the smoke or smell tests has surprised not a few proprietors and tenants, when they by these tests discovered the condition of the drains passing under the houses from the conveniences at the back to the street sewer at the front. This state is not surprising to any one who knows the status of intelligence possessed by the men generally employed in laying house drains. As regards sewers, Glasgow may be considered well off, although the central and western districts are frequently subject to very offensive smells. These smells prevail chiefly over the area on the north bank of the Clyde, bounded by the river on the south, High Street on the East, the Kelvin on the west, and George Street on the north. The district which may be called the north-west, laying between Saint Rollox on the east and the Kelvin on the west, is peculiarly exposed to these bad smells. They are caused by the combination of refuse from manufactories of almost every description combining with the domestic refuse of a population numbering over 100,000. As all the sewers fall into the Clyde within the limits of the city, and as in every case (I believe) the mouths are closed by the tide for some time before and after high water, it of course follows that the contents of the sewers are dammed back for some hours daily, thereby causing the foul gasses to be driven back to the houses on the highground, so far as they do not escape through the street gratings, or into the town houses by the bad drains.

On the matter of cleansing or scavenging Glasgow cannot justly boast. The most public streets are tolerably well attended to, but the less public and the lanes that run between them are many of them in a very dirty condition, offensive to both eyes

and nose. The authorities have for many years maintained vast collections of manure within the limits of the city, and they have for some time been busy establishing what they are pleased to call manure dispatch works, in spite of remonstrances from the inhabitants who suffer from them. These so-called dispatch works are, in truth, manure factories, and are defended on the sole ground that the quantity of refuse in Glasgow is so great that every effort must be made to manufacture an article worth the notice of the farmer. A very proper object in itself, but it should be attended to at a greater distance from inhabited houses than these dispatch works have been located. The provisions of the Public Health Act, 1867, are violated daily and hourly by the sanitary authorities of Glasgow. It is true that an exception in the Act is plied as justifying the situation within the city of great heaps of most offensive refuse. Why such an exception should be considered to be an advantage is a puzzle to me, and the fact of its being taken advantage of furnishes a proof of the low state of feeling or opinion of the sanitary officials and the members of the local authority. In the collection of the most offensive portion of refuse (the contents of the latrines in factories) no attempt is made to deodorise before conveyance through the streets to the works; and this is defended on the ground of economy. It would have been well for the city had this same profound desire for economy been followed in other matters of much smaller importance for the well-being of the inhabitants.

How, then, is the present state of things to be improved? House drains should be carefully constructed and periodically inspected; the sewers should have deodorants poured into them from their beginning to their termination; and the Public Health Act should be amended by empowering the imposition of personal penalties on officers and members of local authorities who neglect their duties. Penalties paid out of the rates are not felt by those upon whom they are nominally imposed. The local authorities are supposed to be under the control of the Board of Supervision in Edinburgh. Nothing more inefficient than that supposed control can be imagined. The local authorities can sue private individuals for penalties if the Public Health or local Police Acts be infringed, these same authorities being, in many cases, the greatest violators of the provisions intended to protect the public weal. It might be too much to say that the high death-rate prevailing in Glasgow is to be ascribed to the action or inaction of the local authority; but it cannot be denied that, if great collections of public refuse near to dwelling-houses, and within the limits of the city, are nuisances and injurious to health, then some portion of the death rate may justly be said to have been caused by the default of those to whose care the public health has been entrusted.

Dr. A. CARPENTER said with regard to the paper read by Mr. Muir, he was sorry at certain expressions contained in it, because he (Dr. Carpenter) was so convinced of the high state of efficiency that existed amongst the officials of Glasgow, and of their desire to promote good sanitary work. He was sorry indeed that an attack had been made upon them. He was certain that the officials of every town represented to a great extent the intellect of that town, and when an attack was made upon officials for not doing something which the assailant thought they ought to do, it really meant an attack upon the representatives who had appointed these officials. and from the representatives an attack upon the people. He was quite sure that the Institute coming to Glasgow had no anticipation whatever that any kind of attack would be made upon its citizens, or upon those whom they appointed to represent them. He knew from his own personal knowledge that the effect of the sanitary operations of Glasgow had produced the most beneficial results, and that, with these results, however great, the officials themselves were not satisfied, but that it would be their endeavour, undoubtedly supported as they would be by the people of Glasgow, to reduce the death-rate from 25 or 26 to nearly the death-rate which it ought to be, of perhaps 16 or 17 per 1000.

Mr. G. W. MUIR, Glasgow, in replying said, with reference to the attack on the authorities and officials of this city, he had only to say that he had not followed the example of the gentleman from Southport, who had come there to read a paper about Southport. He had made the attack in the place where it might be answered. He was not afraid of the statements he had made. He could prove them, notwithstanding the laudatory terms in which Dr. Carpenter had spoken. The officials of Glasgow, he believed, were about as good as any other officials—but what he said was that he hardly knew any officials who did their duty. They would have an opportunity of judging. It had been intimated to them that they would have an opportunity of seeing old Glasgow in photograph. He was very sorry that, with few exceptions, it was the only sight they would have of the good old town. But he could also give them directions which were not in the programme of interesting places that they might visit in Glasgow. They might go to the enormous dung heap at Pollokshields, about two acres in extent; they might go to the one nearly as large in Baltic Street, Bridgeton, and there they would see the system that had obtained in Glasgow until very lately. Then they might also go to Charles Street, St. Rollox, and they would see

one of the dung manufactories. Now, these were the property of the Corporation, and they were in direct violation of the terms of the Public Health Act of 1864, which provided that no such things as these should be within the bounds of the community, or anywhere within fifty yards of any dwelling-house. The thing was intolerable to him to hear men lauded who he knew had systematically broken the law. There was another thing. On Saturday afternoon last he spent an hour or two in walking through the mews lanes in the immediate neighbourhood of where they were met, and if they wished to see modern Glasgow in its reality, and not in photograph, they should take a walk down those mews lanes. They would find that at every house, the rents of which would be from £100 to £150, there was a great, big, deep pit in the rear, where stuff was deposited and allowed to fester from six to twelve months. The commonest sense would show that that system should be immediately abolished. He should have liked to hear Dr. Carpenter explain how it was that while the death-rate in Catheart parish, two miles from where they were met, and the death-rate in the burghs of Govanhill and Crosshill was 16 and 15 per thousand, the death-rate in the city was 25 per thousand. That would have been something like answering the attack. He was sorry to have to attack the officials of Glasgow. He knew them almost all personally, and he should like very well if he could speak favourably of them. Whenever he could, he did so.

On "Notes on House Sanitation in and round Glasgow," by GILBERT THOMSON, M.A., C.E.

During the past year I have examined on behalf of the Glasgow Sanitary Protection Association close on three hundred houses. A number of these were country houses of various sizes, but the majority were in the city and suburbs of Glasgow, and varied from single flats to some of the largest and most expensively fitted houses in the district. As a rule, however, they were of the better class.

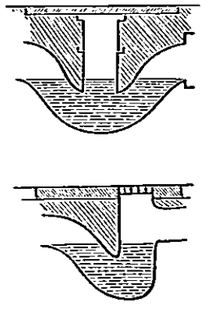
In the course of these examinations, a great amount of both good and bad work was seen, and the following notes have been selected as being likely to be of general interest. A first-class house in Glasgow contains a considerable amount of plumbers' work, and from what I have heard of other places, my impression is that the quality here is rather above the

average. The laying, and more especially the repairing of fire-clay drains, is to a considerable extent in the hands of the plumbers.

In considering the drainage system of a house, everything outside the main-trap or traps may, as a rule, be disregarded. There are many instances, however, in which that does not hold good, and where the state of the sewer outside the trap may affect the house almost as seriously as its own drain. It is no uncommon thing to find a terrace in which the common sewer runs under the front or back areas of the houses, sometimes so close that there is not room for a trap between the house wall and the sewer. The condition of the sewer is often very doubtful, and unfortunately, except by actual opening up, it is very difficult to discover if anything is wrong. In one such sewer, which was exposed recently, the joints of the pipe were perfectly open, and on three or four lengths of pipe there was a fall the wrong way of three or four inches. Naturally the foundations of the house were far from dry.

In the same connection may be mentioned the danger which may arise from the bad drainage of adjoining houses. The following case illustrates that very strikingly:—An outbreak of diphtheria took place in one of a row of self-contained houses, and the proprietor, suspecting his drains, employed a plumber to put his house in order. The drains were found to be very bad, but were thoroughly overhauled. Not very long after there was another outbreak, and our association was applied to. The house was examined and found to be very satisfactory. Permission was then obtained to test the two adjoining houses, and a quantity of paraffin was introduced into the drains of each. In a few minutes the smell of paraffin found its way from one of them into several parts of the house first tested, causing a strong suspicion that the disease germs had got access in the same way.

Coming to the house system itself, the main trap is the first thing to be noticed. The form most commonly met with is what is known as a common lying trap, that is, a syphon bend with a centre eye for cleaning. There are also a number of built cesspools, more or less tight, but both of these are gradually being superseded by ventilating traps, which are designed to admit fresh air into the drain. Of these Buchan's trap is the one that is generally used. The change is doubtless a great improvement, but it does not do to entrust the alteration to unskilled hands, for some men



have evidently no idea whatever of the use of a trap. The following case came to light recently:—

A proprietor was not very sure about his drains, but in order to make sure that no gas from the main sewer could enter the house, he had a Buchan's trap put on the outlet. Some time after a house two or three doors off was tested with paraffin, and in the basement of this carefully guarded house the smell was noticed very distinctly. An examination was then made of this house. The drain was found to be in bad condition, and the trap was arranged with great care, so as to be absolutely useless. It had two openings, one on each side of the waterseal. The one on the sewer side should have been plugged, and only opened if required for cleaning, while that on the house side should have had a grating at the surface for ventilation. In this case, however, both were left open, a brick box was built round all, and a close-fitting flagstone was set on the top. The passage thus formed over the trap was evidently taken advantage of both by sewer gas and by rats. In another house a Somerset trap, which is somewhat similar in construction, was set in a style not much better.

The following plan was still more efficacious for the admission of sewer gas. An old house had a built drain under it, which passed to the sewer through a built cesspool, trapped by means of a stone tongue. The drain, apparently, had not been tight, as a bad smell was complained of. Thereupon, men were set to open the drain and to lay a fireclay pipe through the house. This they did by taking off the covers of the drain, laying a fireclay pipe in the bottom, and replacing the covers. The end of the pipe merely projected into the cesspool. This arrangement, of course, left free connection between the cesspool and the old drain, *outside* the new pipe. To make a complete job, the tongue of the cesspool had been broken, either during these repairs or previously; and its trap being thus destroyed, the house was left in full communication with the sewer. Fortunately the atrocious smell led to an investigation before anything worse than occasional sickness had resulted.

With regard to the house drain, it would seem that the average Glasgow house, though very far from perfect, is considerably better than the average London house. The drains are often found to be leaky and dirty, but it is a rare thing to find a house in which the bulk of the sewage at least is not passing away. The great majority of the drains are fire-clay pipes, sometimes cement jointed, sometimes clay jointed, and sometimes not jointed at all. A large number of them are found to be defective when tested with paraffin or smoke. One case was very instructive as showing how a very bad state of

the drains might be quite unsuspected, even on a partial examination. The house was a comparatively new one, perhaps three or four years old. The drain was readily accessible at an open trap outside the house, and on running water from various baths and closets, it was seen that the water came freely and clean to this trap. On testing the drain with paraffin however, the smell appeared immediately throughout the basement, and it was found that a branch of the drain from the foot of a soil-pipe was for a length of six or eight feet smashed to pieces. This soil-pipe was only from one closet, which had not been tried at first, but it was sufficient to convert a space of several square yards into a dunghill. Curiously enough, no smell had ever been noticed, and no illness had ever taken place in the house. A common mistake here is the excessive size of the drain-pipes. I have seen a 12″ pipe from a single soil-pipe, and 9″ pipes are very frequent. Cast-iron pipes are beginning to be used here for the horizontal drains, but as yet to a very limited extent. They are generally coated with Dr. Smith's composition, and jointed with lead. The usual diameter has been six inches. Though there is no doubt that a fire-clay pipe may be made tight, there is I think as little that the iron pipe is superior.

Lead is now almost discarded here as a material for soil-pipes, iron having taken its place. The joints are made generally of red lead and hemp, staved into the faucet. When the pipe is heavy enough and when the jointing is well done, the job is a safer one than a lead pipe would make; but there is the danger that light pipes, which will not stand proper jointing, may be used. On the whole, however, I have found fewer defects in iron pipes than in even comparatively new lead ones.

In a great number of cases the same pipe does duty both as a soil-pipe and as a rain-pipe, the lower part being 4 or $4\frac{1}{2}$ in. diameter, and the upper part about 3 in. I have frequently found, in testing, that a smell of paraffin which was noticed in the house was distinctly traceable to the top of a rain-pipe, from which it was blowing in through a ventilator, a skylight or cupola, or even under the slates. The entrance of foul air in this way is therefore not merely a theoretical possibility, as it is often thought to be, but an actual fact. Offices, warehouses, and the like, with low-roofed wells surrounded by higher buildings, frequently receive foul air from the short rain-pipes.

There is one advantage, however, in the practice of using rain-pipes for soil-pipe ventilators, and that is that it ensures some sort of continuity in the pipe, and that it will end outside: otherwise, there is no saying where the air-pipe may go. This of course refers to existing houses more than to future ones. I

have found a house in which the air-pipe ended in the attics, and another where a pipe, which appeared outside the roof as a proper air-pipe, had a want of continuity, part of it having slipped down, with the result that the drainage system was largely ventilated into the nursery. Zinc pipes, more or less tight, are sometimes seen. On the other hand the arrangement is, in many cases, found to be very good, and the workmanship thorough, for a large number of plumbers in Glasgow are quite competent both to design and execute good work.

The practice of putting up separate pipes for closets, and for such fittings as baths and basins is extending greatly, and besides its other advantages, has the important one that the connection of the closet trap into the soil pipe has a much better chance of remaining tight when no hot water passes through it.

Of the water-closets in use here, the pan-closet is most frequently met with, even in the better class of houses. In them, however, it is steadily being displaced, the usual substitute being the Bramah. The writings of sanitarians have been effective so far that a considerable section of the public is quite aware that a pan closet is not a good thing, and this will, no doubt, come to be more and more considered by builders. In new houses pan closets are sometimes put in, which in their outside appearance and mountings have, when boxed in, some resemblance to Bramah closets. Bramah closets are largely manufactured in Glasgow by a number of makers. The frame and trunk are generally of iron, and the valves have India-rubber seats. They are made at prices ranging from about £2 10s. 0d. to about £4 10s. 0d. Many of them have ingenious lever arrangements to give a short lift, but I am not sure that the advantage is worth the extra cost. There are also a number of wash-out and hopper closets used, the prices of some of the latter being as low as 10s. or 12s.

When Bramah closets are used, syphonage of traps is a very decided danger. It is seldom safe to assume that any such closet is certain to leave both its own trap and the neighbouring traps full of water, and the test which I generally apply is to disconnect the water supply, fill the basin up to the overflow, and, when the water has come to rest, open the valve. The seal of the trap is then measured, and compared with the measurement after running water slowly in. A lookout is also kept at any fittings near for the sound of air gurgling through their traps. On referring to my notes, I find that about 250 Bramah closets have been thus tested, and of these about 60 affected distinctly either their own or neighbouring traps. The latter case is the most serious, because usually the closet trap in actual use will be filled again at once, but if a basin or bath

trap is syphoned it may remain empty for an indefinite time. One such case was a basin close at the side of a bed, the trap of which was invariably emptied by the use of a closet off the stair-case. When a closet with what seems to be a sufficient air-pipe acts in this way it generally turns out that the air-pipe is choked or obstructed, as, for instance, by a bird's nest. It is a common practice to provide ventilating pipes from the trunks of closets, both Bramahs and pans. These pipes, in a number of instances, lead to a serious defect, as by them the trunk of the closet is sometimes directly connected with the soil-pipe, the assumption evidently being that the current of air will always be upward and sufficent to prevent any back draught. This, of course, is very far from the truth.

Basins and baths are occasionally found to syphon their own traps, more especially when the outlet-valve is closed, before all the water has passed out. The most common case is when a small pipe has been put up for one or two basins, and is not ventilated at the top. In one such case a ventilating pipe from the top of the trap was recommended. Shortly after we were informed that this had been done, but that the gurgling sound was as plain as ever. An examination showed that the ventilating pipe had certainly been put in, but that it was connected to the wrong side of the trap.

The water supply in Glasgow involves less danger than it does in many places, as the greater part of water for drinking and cooking is now drawn direct from the main. In most cases the scullery and pantry sinks, at least, are supplied in this way, and the general rule now is, that all baths, basins and sinks are supplied direct from the main. In addition to this, it is compulsory that in all new work, the cistern overflow pipes should end openly, and this removes one chance of pollution. The old place for the overflow pipes was into the bottom of the closet trap, and much more rarely they are found to be run direct into the soil-pipe, and in these cases they are generally trapped in some fashion. These traps are usually dry.

One very fruitful cause of danger is the thoughtless disuse of various fittings. The idea is very prevalent that when a closet or basin is little used the danger is correspondingly small, and I am frequently told that "this closet is hardly ever used;" the inference often being that it is hardly worth while looking at it. The very reverse is of course the case. One instance of this I saw lately. A large house had a closet off a bed-room, but it was thought not to be a good thing, and ordered to be taken out. The closet was taken out, but the cistern was allowed to remain. The overflow-pipe of the cistern went direct to the soil-pipe, and had a bell-trap on the top. The chances

were against this bell-trap being effective at any time, but the cutting off of the water made the matter quite certain, and left a good-sized opening for foul air to enter. Another house had a day and night nursery, each provided with a basin. This was thought not to be very safe in the night nursery, so the water supply was cut off. The trap before long was quite dry, but, fortunately, the danger was discovered soon after. Another instance of this was where a bed-room had been converted into a conservatory, and the basin into a flower-stand.

The examples I have given have all been found in and round Glasgow, except that the numbers of Bramah closets tried for syphonage include country houses as well. The country houses were, as a rule, less varied in their character, that is, more of them were either very good or very bad. The probability is that unless a country house is new, or has been recently overhauled, its drainage will be bad; and even if the work is recent it may not be above suspicion. In the older houses built drains of large size, and cesspools which are of course never cleaned, lie hidden in the most unlikely places, and very commonly the air from them can enter the house freely. It is, however, needless to generalise on such subjects with a view to showing that danger exists, as it must be evident now to everyone that bad drainage is extremely common and very dangerous.

Professor James Thomson said, with regard to Mr. Gilbert Thomson's paper, he very much approved of the efforts of the Glasgow Sanitary Protection Association for which Mr. Thomson was acting. He, Professor Thomson, was himself a member of that Association, and he thought it would do a great deal of good, He wished to ask for any information that Mr. Thomson could give as to the relative merits of the smoke test and the paraffin oil test. The smoke test, he considered, had the important advantage of giving very strikingly visible indications of leakage, and of helping, often very effectively by eyesight to the detection of the places from which the leakage proceeded. He would like to know whether the percolation of the paraffin oil into the ground under dwelling houses in case of the pipes being in fault, was ever found to produce any long continuing nuisance in the house where the test was applied, or in neighbouring houses. Of course he considered the smoke test was a little more difficult than the pouring in of paraffin oil.

Mr. E. C. Robins, London, was glad to hear that there was such an association carrying on operations in Glasgow. He was vice-president of a similar society which had lately been founded in London,

and it had wrought very successfully. They were enabled to give much assistance to householders who were anxious to improve the sanitary condition of their dwellings, but did not know how to set about it. He had never used the paraffin test, but had found oil of peppermint mixed with hot water to answer very well. If anything, the smoke test had the advantage over others, as it could be both seen and smelt.

Dr. A. Carpenter said they should be careful whilst making all these arrangements to prevent the introduction of sewer gas, and also careful while fortifying the fortress, so to speak, of the individual house not to leave the drains and sewers in such a condition that gas might be generated with impunity. Wherever there was a development of that kind in any particular sewer, that sewer was defective, and it was to that defect that attention ought to be specially directed. Everything should be done to prevent the development of that which was certainly not a necessity of the sewer system. Any sewer system which gave out gas was defective, and on no condition ought to be allowed in connection with sanitary work which permitted putrefaction to take place in the sewers. These ought to be as clean as the kitchen sink should be kept by the cook, then no evils would arise from the drains. That was the great principle which ought to be at the bottom of all sanitary operations.

Mr. H. H. Collins, London, said he could not help recognising the difficulty of getting a sewer into the admirable condition which had been portrayed by Dr. Carpenter. To obtain a gradient to make the sewer a satisfactory one the ratepayers and Local Authorities would have to be appealed to. It would, however, be difficult to convince the ratepayers that it was necessary or desirable to spend money for such a purpose. If he found a sewer defective he would do his utmost to disconnect the house from it, and leave it to the Local Authorities to do the remainder. A large amount of good could be effected by flushing the drains regularly. Though he had not used paraffin oil, he had employed peppermint and ether, for the purpose of tracing the escape of sewer gas, but he had a preference for ether. In this way he had always been able to discover any escape of sewer air.

Mr. Gilbert Thomson, in reply to Professor Thomson's question, said the smoke test had this advantage over the other, that it was visible, but on the other hand the paraffin test was easily and rapidly applied. He had experienced very little difficulty in getting at the exact spot where a defect existed when using paraffin, as the smell could not be mistaken. The mode of applying it was to pour it from the top into the soil pipe or conductor.

On "The Case of Southport. An Illustration of the Danger which Threatens the Existence of a Health Resort," by STRETHILL H. WRIGHT, M.D.

MR. PRESIDENT AND GENTLEMEN,—I have been led to believe that a very short paper, dealing with some features of that product of the conditions of modern life—a health resort—might not be unwelcome to the members of this association; and that some of the dangers which are very apt to threaten the well-being of a growing health resort, might be fitly considered on this occasion.

A health resort I define to myself as a place possessed of such natural hygienic advantages, that the workers in the hives of modern industrial life, and the sick and the invalid, are drawn to it—the first to secure for themselves and their families healthy homes away from the great centres of industry; the others bearing the burden of hereditary disease, or overdone in the battle of life, come to it, to recover it may be health and vigour amid sanitary conditions best fitted to promote recovery from temporary illness, or to render life more endurable in circumstances of chronic ill-health. So thinking I am justified in advancing the proposition that any sin against the laws of hygiene in a health resort inflicts injury, not only on its inhabitants, but also injury, it may be deadly injury, on the numbers of those whose welfare depends upon the preservation for them unimpaired of those conditions of healthy living, which have in health resorts been provided for their use.

I think it is not a bad plan in considering any subject to select a special instance illustrating it, and, by dealing with the special instance, establish an example for imitation or avoidance.

I shall, acting on this belief, take the town of Southport, in Lancashire, a health resort which, with its suburb of Birkdale, has, during the last fifty years, risen from a fishing village planted in the midst of Sand Dunes to a town of 43,700 inhabitants. Southport and Birkdale are, however, two distinct places: Southport is a borough, Birkdale is under a local board. It is with Southport borough we have to do—a borough, I believe, with the high rateable value of £200,382, on the census, 1881, population of 32,191 persons.

I shall, in the following, beg very shortly to describe to you the position which Southport, during her fifty years of life, has

attained in this part of the country where she has grown; the reasons which have qualified her for taking that position; and the dangers which now threaten her prolonged prosperity. And I shall ask you to remember that what I describe as the dangers which threaten Southport are also dangers which threaten all towns of like pretension and like circumstances. Southport owes her rapid growth and favour with which, until recently, she has been regarded, to the possession of great natural advantages. Men of business from Liverpool, Manchester, and all surrounding Lancashire manufacturing towns, have, when their position in the world has been secured, flocked to Southport, that they might in it establish homes where their hours of leisure might be passed, their families live, and their children be reared, amid the conditions necessary to a healthy life. Invalids have frequented the town in numbers because they found its remarkably equable and dry climate, its flat surfaces, and its thorough ventilation by south and west winds, were favourable to the re-establishment of health.

Southport has grown as the home of well-to-do people and as a worthy sanitorium for the North of England. I believe that very fairly have many of the indications of a correct sanitation been carried out; but in one very important particular the municipal authority of the town has failed; it has failed to provide the town with a satisfactory system of drainage, and, I fear, has failed to appreciate the requirements of Southport in this important particular.

I have stated that Southport possesses great natural advantages; but I again urge the expression of my belief that these are in process of being altogether nullified by an unsatisfactory drainage. Allow me to adduce facts in support of these allegations.

Southport is situated on the Sand Dunes, nearly midway between the estuaries of the Mersey and the Ribble, on the seaward margin of an immense open tract of flat country. A section of the soil, a mile-and-a-half inland from the sea beach, would give peat superimposed on clay; as the sea is approached gradually the peat is overlaid with a layer of blown sand of thickness varying according to the inequalities of the sand-drift. By degrees the peat layer thins out, and under the greater part of the town borings give blown sand superimposed on clay and marl.

I am indebted to Mr. Glaisher, F.R.S., and Mr. Joseph Baxendell, Meteorolgist to the Town Council of Southport, for the following meteorological data. The observations from which these conclusions are drawn embrace a period of eight years.

The mean annual temperature for that term of all the meteorological stations given in the Registrar-General's returns equalled 48°·4. For lat. 53° 54°, 54° 55°, it equalled 47°·0.

Southport is situated in lat. 53° 54°; its mean temperature equals 47°·2.

The mean daily range, a matter of extreme importance for persons in delicate health, equalled for all stations 14°·7 for lat. 53° 54°, 54° 55°, the range was 13°·0.

Southport has a mean daily range of 11°·5.

The annual rainfall of all stations equalled 33·9 inches on an average. The annual rainfall of stations lat. 53° 54°, 54° 55° equalled 37·6 inches. The annual rainfall of Southport equalled 37·7 inches.

At all the stations the wind direction was as follows:—

North and East winds blew on an average..... 147·9 days per annum.
South and West ditto..... 210·1 „ „

At Southport

North and East winds blew on an average..... 120·1 days per annum.
South and West ditto..... 243·7 „ „

The excess of south and west winds over north and east was 62·2 days for all stations.

In Southport the excess of south and west winds over north and east was 127·7 days per annum.

I have, from data afforded me by one of the leading men of business in Southport, made a calculation by which I find that the density of the population in Southport is barely nine persons to an acre. The density in 22 large towns in England and Wales in the Registrar-General's Annual Report give 38 persons to an acre.

The rateable value of Southport makes it nearly the wealthiest town for its size in England.

The experience of medical men and that of many sick persons confirms the belief that the climate of Southport exercises a very favourable influence upon bronchitis, pulmonary phthisis in its earlier stages, cardiac disease, and some forms of renal disease.

The significance of the foregoing facts seems to me to be as follows:—The Southport of to-day is a very wealthy town, especially laid out as a health resort, possessed of ample air spaces. The proportion of nine persons to an acre is out of all count below the proportion for towns of like size, so that none of the ill effects of over-crowding can possibly be operative here. The town is so situated that her wide streets are constantly ventilated by south and west winds. The climate is very

remarkable for its equableness. Although the rainfall is very slightly in excess of the average, the porous nature of her soil makes the moisture at once disappear, leaving the surface dry. These conditions would, *à priori*, render it likely that Southport would be a favourable place for the treatment of various diseases, while the experience of the past has proved that it *has* been so; and that it should be a healthy residence. The experience of Southport's present condition does not bear out this reasonable expectation. Numerous complaints of residents, fortified by the mortality statistics of the town, prove that the salubrity of the climate of Southport and its health standard have not, for years past, and are not now, what her salubrity and health standard should be. I would, in the remainder of this paper, demonstrate the causes of this evil state of matters, which I believe to be entirely remediable.

A new drainage scheme was designed for Southport by an eminent and well-known engineer, and was opened in 1878. The gradients obtainable in Southport vary from 1—1,500 to 1—5,000 and the outfall is 4½ miles from the town. I do not wish to enter into a detailed account of this system, but I would remark that the principal feature is the smallness of the gradients and consequent slow rate of the sewage stream. The whole system is tide-locked twice in twenty-four hours. The ventilation of the sewers is effected by grids opening at short intervals in the streets. Through these grids sewer gas passes in large quantities, and makes its presence known by very disagreeable smells in the streets, and even houses of the town, which it enters through the windows. An attempt has been made to increase the ventilating surface provided for this drainage system by the erection of ventilating pipes at the sides of houses. This is, I think, a method of very questionable advisability, as cases have been known of illness caused by sewer-gas sucked from the ventilators down the chimneys of houses to which they were attached. In the belief of the inhabitants, which I hold to be well founded, these drainage emanations are the causes of numerous disorders of health, of head-ache, sickness, depression, and so on. The universal existence of these smells is substantiated by memorials, numerously signed by inhabitants, from all parts of the town, and has been publicly admitted by the Corporation of the town and by Major Tulloch, R.E., Inspector of the Local Government Board, who at a recent inquiry at Southport held it unnecessary to call witnesses to prove an admitted fact. Such an admission carries with is a great deal. It implies not only that very frequently, and more especially at certain states of the weather and tide, sewer-gas passes in very large quantities

out of the drain, and makes its presence known by evil smells; but that at all times the atmosphere of the town is tainted with sewer emanations. Sewer-gas may be present, and do harm to health, though its quantity is inappreciable to the sense of smell, and because certain sewer-gases are inodorous. The conditions in such a drainage system are always present for the formation of noxious gases and their discharge.

The reputation of Southport has, since the opening of the drainage system, widely suffered in consequence of these smells, and certainly the value of house property, and the demand for lodgings has, for the last five years, been lessened. In so far it has been established that Southport is not what it ought to be as a health resort, because the inhabitants and visitors are disgusted, and believe they are made ill by drainage smells in its streets. And I believe medical opinion will support the belief, that not only do sewer gas emanations cause attacks of illness, sometimes of the worst kind, but even when not acting with such virulence as to cause distinct illness, a sewer-tainted atmosphere lowers the general tone of vitality, and tends to embarrass recovery from all forms of disease. If this statement be true, certainly the admission that sewer gas is largely present in the air of a health resort is a very serious admission, and will go far to tend to destroy its reputation as a health resort.

For some years past, Southport has suffered from her prosperity; built rapidly on a site which, with its intrinsic advantages also, was in its nature subject to certain dangers, adequate provision had not been made for her drainage as the number of her houses increased; and when, in 1877–78, the present system of drainage was devised, the great flatness of her site entailed sewering difficulties which I think I am justified in describing as insurmountable in the *then* state of sanitary engineering science. The cost of overcoming these difficulties would have been so great that Mr. Mansergh himself stated that the revenues of Lancashire would not pay for those pumping arrangements which alone could be hoped to remedy the difficulty. I have spoken of the town before the inauguration of the new drainage, and then described the difficulties attending it, because I wish, by adducing mortality statistics for both terms, to shew that the wide-spread belief that the sanitation of Southport has not been improved by the present system of drainage is well founded. I shall very shortly speak of the mortality statistics of Southport before and after 1878, the year of the inauguration of her present system of drainage.

The position I now wish to establish is, that the mortality statistics of Southport show that her standard of health has not

been, and is not now, what the health of a professed health resort should be, and that the present system of sewerage inaugurated in 1878 has not materially improved that standard.

I hold the health of Southport has not been in the past, and is not now, what the health of a professed health resort should be, because if it were, her death-rate would compare favorably with that of other places from which people would come to her in search of more favourable health conditions. It does not so favourably compare. And again, if the health of Southport were what the health of a health resort should be, her death-rates would range on a level with those of other health resorts, which they do not.

There is in the Registrar General's reports a table which gives the gross death-rates of 50 large town districts. Now these large town districts have large mixed populations, numbering, on an average, 50,000 persons; and these towns have been built through many years with no special reference to sanitary requirements; and they have no pretensions to be considered health resorts. They, in fact, represent the kind of place from which people in feeble health come in search of the more perfect sanitation, which a health resort should afford. On comparing the death-rates of these places with the rates of Southport I find that for the term 1876-1878, on an average, every year, out of 50, 35 such places had an average death-rate of 20·1, as compared with 23·3 for Southport, and their average population was 55,126, as compared with 27,148 for Southport. For the term subsequent to the new drainage 1879 to 1882, 19·1 of these towns had a death-rate of 17·6, as compared with a death-rate of 19·4 at Southport. So many of these places had a death-rate, absolutely less than that of Southport, but besides these, many had a death-rate very slightly above that of Southport for these years.

I think, taking into consideration the larger population of these places, and the conditions of life in them, a comparison of their death-rates with that of Southport tells strongly in support of the assertion that Southport did not before 1878, and does not at present, merit the reputation of a health resort in relation to them.

Nor do the death-rates of Southport range for the terms 1876-78, 1879-82 on a level with the rates of other health resorts. Thus I some time ago addressed a circular to the medical officers of all watering-places mentioned in the Registrar-General's second quarterly return for each year. I received information more or less perfect from 19 of these. On comparing the average of these death-rates they were all considerably less than the corresponding rates for Southport. I specially quote the rates for the second term 1879-82 after the

opening of the new drainage: Average population of 12 watering-places 20,387, average death-rate 17·1; average population of Southport 32,191, average death-rate 19·4. Lest it be said that the smaller populations of the health resorts accounted for their smaller death-rates, I quote the following: 1879 to 1882, Hastings and St. Leonards, population 42,256, death-rate 16·7; Torquay, population 24,765, death-rate 15·8; Cheltenham, population 46,844, death-rate 17·5; Scarborough, population 30,484, death-rate 18·7; average death-rate of these four watering-places, 17·1. Since these statistics were calculated by me, the *London Medical Record* of July 15, 1883, has published statistics which enable me to compare the gross death-rates of 12 more watering-places for the term 1879 and 1882. Their average gross rate equals 15·1, as against Southport 19·4. The standard of health of Southport, as shown by these death-rates, was considerably below the average standard of English health resorts.

I think that I have proved that the health of Southport has not been in the past, and is not now, what the health of a health-resort should be, because its death-rates compare unfavourably with—first, those places from which persons in search of better health conditions would come to it, and because its health standard, as shown by its death-rates, compares unfavourably with the health standard of other health-resorts.

I would now adduce some facts to show that the new system of drainage has not improved the health of Southport. Had it done so, we might have expected to find a marked fall in the death-rate of the town after its inauguration. The new system came into full operation at the end of 1878. The death-rates for 1877–1878 are 22·8, 22·8. The death-rates for 1879–1880 are 20·8, 22·9. The average of two years after the drainage year give a drop of 1·0, a small improvement indeed, and even this is explained on the plea of a drop in the general death-rate of the country. The same calculation gives a drop of ·8 in the England and Wales rates, and a drop of ·7 in the average death-rates of all the 50 large town districts. There are other points I should like to enter upon, but time and, I fear, your patience, both forbid a too long discussion. I should only like to say that, though in 1881–1882 the death-rate of Southport dropped, its drop took place, to a great extent, in the death-rate list of infants, and was coincident with a very marked drop in the birth-rates.

I now enquire what light a consideration of the death-rates of the drainage diseases, par excellence, *typhoid fever*, *diphtheria*, *scarlatina*, throws upon the question of benefit or no benefit to Southport since the new drainage system. I find as follows:—

Typhoid fever in 1879 a drop of ·43 indeed occurred, but then I also find that in 1877 a drop of ·78 occurred, which could not be due to the new drainage, which was not then laid. I do not, therefore, see why the drop in 1879 should be attributed to its good effects, and not to the unknown influences which produced the drop in 1877. And although the death-rate dropped in 1879 it has since shown a distinct tendency to rise, as the new drainage might be supposed to make its influence felt following the sequence for 1880, 1881-82, of ·22, ·31, ·17, and for the first half of 1883 ·28. And this is the more significant because the corresponding rates for England and Wales have been ·26, ·18, ·20, giving an average for the term of ·21 against ·23 of Southport; while for the first half of 1883 England and Wales gave a typhoid fever rate of ·19 as against ·28 Southport.

The diphtheria death-rate gives still more unfavourable testimony as to the effects of the new drainage. For the years 1879, 1880, 1881, 1882, the rates are ·06, ·09, ·18, ·20: it has steadily risen. And though it dropped in 1879, still that cannot be attributed to the beneficent influence of the new drainage because in 1873, 1874-75, 1876, the sequence was ·00, ·00, ·04, and ·18, before the drainage was laid. And also the average death-rate for England and Wales for the term of 1879-82 equalled ·11, Southport ·13. The scarlatina death-rates also give unfavourable testimony as to the effects of the new drainage. Formerly there was little or no scarlatina in Southport, and since 1877 it has been markedly present and has steadily increased:—

1876	1877	1878	1879	1880	1881	1882
·00	·07	·51	·16	·12	·34	·44

In 1882 the Southport scarlatina rate, ·44, nearly equalled the England and Wales rate, ·51.

I cannot compare the fluctuations of these death-rates as they occurred for the above term in large town districts. I cannot gain the data as far as my search has gone. I content myself with giving a summary of the number of deaths which on an average occurred in the health resorts, quoted by me in my pamphlet on the sanitary condition of Southport, and in Southport for the term 1879—1882:—

	Health resorts. Average totals.	Southport. Totals.
Typhoid fever	14	25
Diphtheria	3·2	18
Scarlatina	12	35
	29·2	78

I think that, as far as the death-rate of typhoid fever, diphtheria, and scarlatina, the sewerage diseases par excellence show, certainly the new drainage system of Southport cannot be said to have improved its standard of health, and its establishment certainly has not been followed by such a marked improvement in these mortality returns as to place Southport on a par with other health resorts, or to justify the allegation that her health standard is what the health standard of a health resort should be.

And in conclusion I would submit that all these mortality statistics I have given, whether they represent the gross death-rate or the rate of special diseases, establish my allegation, *i.e.*, they do not present any proof that the new drainage system has benefited the town, but they indicate a contrary conclusion.

There is another danger which partly threatens the sanitary condition of Southport and its reputation as a health resort, that is the high level and impure condition of its subsoil water. On an average the subsoil water is at a level in Southport $3\frac{1}{2}$ to 4 feet below the surface, and to my own knowledge at certain times it renders quite wet, and even stands on the floors of the cellars of houses in various parts of the town. Ten specimens from various parts of the town, and from the cellars of houses have been analysed by Mr. A. Smetham, F.C.S., and on a consideration of the total results obtained he pronounces the subsoil water to be so contaminated with sewage matter as to be dangerous to the health of the inhabitants; certainly a complete drainage scheme for Southport ought to make provision for lowering the level of its subsoil water.

I would venture to submit that in the foregoing remarks I have established that the town of Southport naturally possesses sanitary advantages, which would entitle her to take place as the leading sanitorium of the North of England, and especially of the great mercantile and manufacturing towns of Lancashire and Yorkshire. I have established that a great danger threatens and has threatened her qualifications as a health resort in the difficulty of draining her site, and in the inadequate system of drainage now laid down, which does not and cannot in the nature of that site, quickly, safely, and inodorously convey the sewage away from the town, and does not deal with the very important matter of lowering the high level of its impure subsoil water. That I may clear myself from the imputation of having demonstrated an evil for which I can propose no remedy, I would close these remarks by stating my belief that Mr. Isaac Shone's system of pneumatic drainage would solve the drainage difficulty at Southport, and places labouring under the like disadvantages of flatness of site. In doing so it would relieve her of her one great sanitary disability, and would set her free to rise to her natural place of a leading sanitorium of the North of England.

Dr. A. Carpenter said it was a pity Dr. Wright's paper was not read at Southport. They should not as an Institute take up their time so much with details of places at a distance as with principles.

Professor H. Robinson, M.I.C.E., said that as they had not the benefit of the presence of the engineer, they could hardly go into the matter of Southport. The gradient of the sewer was very flat, and it would be necessary to make an artificial flush. He would like to know what had been done with regard to the house connections. Could Dr. Wright tell what were the arrangements made for the protection of the inhabitants from the entrance of sewer gas from the main sewers? Some of the most perfect systems of sewers were liable to develope sewer gas, but the mischief occurred when it was introduced into the houses. He thought they ought not to assume that the evil was attributable to sewerage *per se*, because he would like to have the presence of the engineer who designed the sewers, to know what were the gradients, and what were the connections with the houses. If he found that a flat sewer could not be avoided, he would resort to artificial flushing. He did not wish it to go forth that the Congress assented to the idea that the mischief in Southport was attributable to the system in operation. He also disapproved of any addition being made to a paper after it had been sent in and accepted, as it might lead to a longer discussion than the paper itself.

Captain Douglas Galton, R.E., C.B., also held that it would be impossible to discuss the question of Southport, because they had not a description of the drainage, nor was there anyone present to speak on behalf of the system. It was perfectly true that a discussion had been going on at the meeting of the British Association at Southport upon the system of drainage, at which discussion it had been reported that the engineer would be present. He would only observe that the real difficulty with the drains arose from their flatness and the town being only a short distance above the high water level. The whole district was entirely of sand, which often blew into the drains, and, choking them, created great difficulties. There was thus a continual need of flushing the drains, and one contention was that adequate means of flushing had not been provided.

On "Hygienic Gymnastics in the Dressing-Room," adapted to persons of all ages, by the CAVALIERE SEBASTIANO FENZI, Florence.

All for the soul and naught for the body—envelope destined to be the food of worms.—So people said some centuries back when ascetic ideas predominated; and there is no doubt that this notion, which no one combated and which all considered, or affected to consider, as an absolute truth has exercised, during the last three hundred years, a pernicious influence on the welfare of our species.

At the beginning of the present century, however, there arose a powerful voice in Germany calling on all German youth to cultivate the discipline that can best educate the body, and enable it to reap all the advantages to be derived from health, strength, robustness, agility, and æsthetic deftness and beauty, and proclaiming further that physical energy gives a corresponding impulse to the intellectual and moral faculties.

It was the strong voice of Frederick Louis Jahn who, inspired by love of his country, and full of faith and enthusiasm, preached the absolute necessity of physical culture in order to succeed in rending the chains with which the triumph of the French arms had then shackled the German Fatherland. His words were understood, and thousands of his countrymen quickly acquired fresh vigour, the effects of which became evident even then, and have ever since—as recent events have eminently shown—told in favour of the greatness and glory of the whole nation.

A race heavily built, devoid of grace and elegance, with joints large and vulgar, a race naturally inert and sleepy, inclined to laziness and drunkenness, is now transformed into a nation of men well built, lithe and strong, and in full possession of energy and valour. This metamorphosis is, we may say, entirely due to physical training, to which, as I have said, Germany has during this century been continually devoting her most careful attention.

This conspicuous example proves of itself, and in the clearest way, the fallacy of the maxim we have above quoted, and must convince everyone that in practical life the body demands its due share of care and attention, and that in order to be adequately equipped for the battle of life, it is not enough for the

intellect to be properly cultivated, but our physical nature must be equally attended to and brought to a high degree of excellence; and this is to be attained only through a rational method of well-selected exercises.

In the course of some remarks which I had occasion to make last year in Naples to a large audience, chiefly composed of gymnasts, I said, "We must confess that in our modern civilization—a civilization we so pride ourselves upon—there exists a great gap, namely, the culture—the adequate training—of our physical being. The elegance displayed in dress, which soothes our vanity, shows that the true wish would be to have our body in a state of æsthetical perfection. And that is, indeed, what we all ought to attain to, if hygiene and gymnastic education received the attention that their true nature and importance entitle them to."

I have repeated these words as they appear to me to contain an idea which it would be well and desirable should not be forgotten.

In this world of ours the existence of every human being is centred in the bodily organism, and by endeavouring to make it thrive and flourish until it reaches the highest standard attainable, we shall undeniably thereby, and thereby alone, be enabled to place ourselves in possession of that exalted state of well-being which we by nature were destined for.

I do not, therefore, understand how in the light of our century this idea, which seems almost a truism, should but with difficulty have penetrated into the minds of those shrewd and clear-sighted men who in our country have taken up the complex question of modern Educational Science.

Among our best writers on Hygiene we reckon Senator Paolo Mantegazza, who by his familiar style has succeeded in rendering popular a large number of ideas and precepts, which disseminated all over the Peninsula, have created a sort of appetite for the knowledge pertaining to this important subject.

In one of this writer's works I have found a phrase which in my opinion deserves particular attention. "If I could condense," he says, "all Hygiene into one single precept—the most important of all—I would say, *move about as much as you can in the open air.*"

There is no doubt that this maxim is pefectly correct, and if those who are opposed to the idea of submitting to any rational method of gymnastics were only to follow out the above rule, I believe that, by itself alone, it would be productive of appreciable advantages, and promote health in all those who systematically conformed to it.

It is a fact, however, that even to this very limited suggestion our present generation, young and old, show themselves averse, not having as yet realized the fact that in order to provide for our individual health, a certain amount of toil and tenacity of purpose is requisite. People generally believe that by merely guarding against intemperance they discharge their duty as trustees of their physical existence.

I wish it were possible that all the inhabitants of our Peninsular could simultaneously receive a powerful shock, such as would compel them to open their eyes to understand and appreciate the utility and paramount importance of the special care that our organism requires, and that, once for all, they were to lay aside the carelessness to which they have for centuries past accustomed themselves, convinced as they are that no reasonable objection could be raised against such abject inertness.

And if this actually came to pass, I feel perfectly satisfied that in the course of a few summers a thorough change would be observable in the aspect of every individual.

Who is there that in passing through the thoroughfares of our chief cities does not experience an intense feeling of pity and disgust in witnessing so many deformities, so many sickly-looking creatures, so many human beings stunted and degenerate, showing to what a state of humiliation it is possible to reduce the human frame, which we say, forsooth, is made after the image of the Ruler of the Universe! How I wish that my voice had the power to reach all my fellow countrymen, and the eloquence to persuade every one to profit by that which a life-long experience has taught me, and which I am now endeavouring to point out with modest words, and with but little hope of being seriously listened to.

Still I will not allow myself to feel disheartened, and shall have my say, convinced as I am that if the philanthropic work I am devoting myself to, meets with but little result, it will still be a spur to others more gifted than myself to try with better arguments to attract general attention to this important matter.

It is but fair to state that we could with satisfaction enumerate many superior minds which have tried to offer to the public the fruit of their reflections on this subject, but it is to be regretted that such writers seem chiefly desirous of showing off their notions regarding Physiology and Medicine, so as to obtain favour with people versed in these studies, without reflecting that the public in general would prove indifferent to their learned disquisitions, rather beyond the depth of the average of readers. I will not say that they have not done something good and noteworthy, but in this manner it is not easy to attain our object, which is to render hygienic gymnastics popular.

After these preliminary remarks I may at once enter upon the subject of this paper.

It is my firm belief, then, that for every human being the education of the body is no less requisite than the education of the intellect and moral nature. And certainly our Government showed that it held the same opinion when, by special laws, it made physical education obligatory for both boys and girls throughout the kingdom. Still, if the efforts of all those who have at heart the culture of our material being are not everywhere manifest, in order to second the wise injunctions of our Government, I fear that very shortly even this semblance of bodily culture will gradually dwindle down and become a dead letter; and this I say notwithstanding the fact that many teachers of both sexes (chiefly from the Normal School of Turin) scattered in the many cities throughout Italy, discharge their duty in this respect with exemplary zeal and self-sacrifice. It is with this conviction, and in order to discharge what I believe to be my duty, that I have been led to write the present paper.

I do not limit my recommendations and advice to the young, but I address myself to all those who will lend me a willing ear, whatever be the age they have reached, being desirous of showing them that there is an easy way of keeping up their health and strength—of, in short, taking a new lease of life.

The method I am about to point out is the one which I have myself practised with perseverance, and which has prevented Time from diminishing my robustness or tampering in the slightest degree with the prosperous state of my health. Allow me to lay modesty aside for a moment and to say that, although I am now in my sixtieth year, I feel, and am, still young. This phenomenon, if I may be allowed to call it so, is not a novelty, however, for in the olden time when Greece had reached the sublime altitude of her civilization, the Macedonian army possessed a phalanx which outrivalled every other for solidity and hardihood, and which proved itself the most unflagging in bearing up against the fatigues of a campaign—namely, the phalanx of the *Argyrasps*, consisting entirely of men who had passed their sixtieth summer, and wearing as a distinctive sign a silver shield—whence their name.

If such men existed in that period of the world's history, there is no good reason why they should not also be obtainable in our own days.

I am fully aware that objections can be raised, there being but few who would submit to the military discipline of ancient

Greece in order to obtain such a result. To this I answer, that no one need be alarmed; I ask only what everyone can readily and easily concede. I will even go further and say that although I may prefer the rules and the method I am about to indicate, everybody may, after taking them into consideration and testing them, diminish them, augment them, or alter them according to individual predilection.

It is evident that if we find it absolutely necessary to exercise daily to a certain extent our intellectual faculties, in order to maintain them at least at the level they had reached through a wise and liberal education in our youth, and thus prevent our losing the fruit obtained, we are bound to continue in a similar way certain bodily exercises which experience points out as fitted to promote and keep up that just equilibrium between mind and body necessary to ensure that enviable state of feeling arising from the prosperity of both, and enabling us to better accomplish our duty in the struggle of life.

This maxim would appear to be an undeniable truth—almost an elementary one, and yet how few there are who regulate their mode of life by it? Some maintain that a walk every day is more than sufficient to secure good health, and there is not a doubt that there is something to be gained by a constitutional walk. But allow me to draw a comparison. A savage supposes he is sufficiently dressed if he wears a short piece of linen round his waist; but in our part of the world where civilization is far advanced such rudimentary clothing is not enough, and everybody feels it a duty to devote a good sum of money every year to the purchase of raiment suited to his condition in life. Well, my meaning is no doubt already understood.

To say that a short exercise in the open air is all that is requisite to ensure the healthy state of our entire organism, appears to me not dissimilar to the span of linen which the savage persists in believing is all that is needed in the way of dress.

Fortunately, in the present century of great progress, in which not only new ideas crowd in, but some of the old ones are being revived as having been unjustly and unwisely abandoned, there is among the latter this one which calls upon us to direct our best attention to our corporeal well-being; and thus in some of the nations north of the Alps the custom prevails of promoting physical health by daily exercises which are not limited to the promenade above mentioned. Among the Germans, and much more so among the English, there are both men and women who illustrate this revival with ideas similar to those held by the Greeks and Romans of old.

I shall not enumerate these ideas for fear of rendering my

paper too lengthy; but shall, without further remark, place before the reader as succinctly as possible what I myself, an old stager in point of bodily discipline, have practised for many years as a method of life fitted to render not only less painful but more gay and happy our short journey through this world from the cradle to the tomb.

The physical inertness to which I had abandoned myself towards my thirty-fifth year was the cause of my becoming subject to sundry ailments which it would be useless to mention here. It then struck me, and very forcibly, that the body inexorably demands the amount of care that is due to it; and after reflecting upon the matter I drew up a programme of daily life to which I have not only always adhered since then, but which I have gradually succeeded in extending and improving, and which judging from the effects at the time I now write, I have deemed not unworthy of being largely known among my countrymen.

And yet before bringing it forward I must express one last idea so as to explain more clearly what the true reasons are which have prompted me to write this paper.

Those who have never directed their attention to physical discipline are easily led to exaggerate the methods followed by others who cultivate such exercises. In the minds of most people we gymnasts are supposed to be something akin to English *clowns*, fond of turning somersaults, and ever on the point of breaking our necks. I, therefore, beg to announce to all who may chance to read these few pages, that if such be their idea on the subject, great will be their supprise when they find how simple the exercises are through which our body is brought into possession of all that is required for its health and prosperous condition.

The foremost precept of all is *perfect cleanliness of the whole body*. Whoever is desirous of ennobling his material being must acquire this precious habit. Hygiene has not a rule more golden than this. I have always felt persuaded of this, and I beg leave to say that besides all the ablutions of early morning, and my extra toilette before sitting down to dinner, I have always been in the habit, without ever departing from it, however late the hour, of not lying down in bed at night without enjoying the sensation of supreme satisfaction (which is in everybody's power) of feeling myself perfectly clean from head to foot by washing my face, ears, and hands, brushing my teeth, and going through all the other ablutions, not forgetting the feet, for which by the way special care is particularly needed.

The second rule, which others might perhaps put first, and judging from its efficacy it might truly deserve to be so, is

moderation in everything—that is *Temperance.* Nature, by some erroneously looked upon as often a heartless stepmother, ever indicates this most clearly and eloquently, and I need not expatiate on the subject.

Having pointed out the above fundamental principles, I shall now begin to enumerate all that experience has taught me to be the daily programme necessary for promoting the health, the well-being, and the happiness of my material being.

In getting up of a morning, whatever be the season of the year, and without fire in my bedroom or in the room next to it (my dressing-room), I take two brushes and, besides passing them vigorously to and fro on my head, I use them to brush most briskly my neck, chest, shoulders, arms, abdomen, legs—in short every part of my body, and for these different offices I have four brushes. I then go through all the exercises which in gymnastics are called elementary, namely, four different exercises of the neck, five of the arms, four of the back and trunk (which imply sundry movements of the spine), and finally, five different exercises with the legs. (Of all these exercises I shall offer a minute description further on.) After this, I hang by the right hand to one of two iron brackets firmly fixed in the wall about seven feet from the ground and a foot and a half apart. I thus support the whole weight of my body for a few seconds, and then repeat the exercise with the left hand and arm. I next hang by both hands to the two brackets, and pull myself up so as to touch the supports with the top of the shoulders, and repeat the movement several times —that is, as long as my muscles allow me to do so without feeling tired.

This done, in order to give the heart time to resume its normal pulsations, I wash—in cold water, of course—my hands, face, ears, feet, and teeth, not forgetting the ablutions under the armpits and the inner parts of the thighs. Immediately after this I place myself in the middle of a large tank made of tin, and, with a large sponge well soaked in cold water, I take my bath—which I might call a "shower bath"—squeezing the sponge on the back of my head and passing it over my whole body. I repeat this three times, soaking the sponge each time in a large basin of water close by.

I then dry myself as the gladiators did of old—not, indeed, with a shell, but with an ivory paper-knife—in order to accustom the body to remain for a few minutes thus drenched without any harm accruing. This done, I rub myself briskly all over with a rough towel, and when perfectly dry I "groom" myself again with the brushes and then return to bed where the reaction takes place in the most favourable manner. And in order that this re-action should the better be effected, experience has taught me that it is well, even in this recumbent posture, to go through a series of movements with the legs, feet, thorax, spine, arms and neck; and these movements will also be found specified further on.

When I have thus gone through the first part of my programme I take an early breakfast in bed, consisting of a cup of tea and a slice of bread and butter, and for half-an-hour I remain in bed reading my favourite newspaper.

Then for the second time I get up and use my brushes, passing them briskly over the whole body from head to foot.

And here I do not think it out of place to state what I habitually do, although, properly speaking, this has nothing in common with gymnastics.

Some years ago I happened to read in the autobiography of an English admiral that he was in the habit of rubbing his head, face, and neck with a smooth round piece of ivory finding that this friction had a salutary influence, not only on the integument of the skull and on the bulbs of the hair, but contributed also to give tone to the brain itself. He also added that in rubbing every part of the face the following effect was produced, namely, that it prevented those fatty substances which spoil the form and appearance of the features from lodging between the skin and the muscular tissue. I cannot positively affirm that such is really the case, but I certainly believe that it has a tonic power, exciting as it does in all parts so rubbed a greater amount of vitality, which is always to the advantage of correct æsthetic shape. As regards the neck, and especially the throat, it is a fact that this tends to promote more vigour and health, and this I can affirm from my own experience.

But to return to my programme of Physical Education. I am in the habit after this salutary friction, of practising jumping, that is, I leap up several times on a piece of furniture made for the purpose, without taking a run but making standing jumps. The piece of furniture in question is only a square wooden box for keeping fuel in, two feet and a half high, with a cushion fitted to it on the top.

Sometimes, instead of jumping on this box, I place a cane on the top of my clubs standing about two feet apart, and jump over it several times, always increasing the distance of the point from which I leap. This exercise is among the very best, because, besides strengthening the muscles of the legs, it tends to effectually keep up the elasticity and agility of the whole body.

Next comes the exercise of the clubs which I have reduced

to only six or seven movements, and of which I shall speak more particularly in the proper place.

After this exercise, I wash more carefully my face, ears, and hands, and perform the other ablutions, besides which I wash my feet, brush my teeth, and pare the nails of my hands and feet when necessary.

And now comes an exercise which will naturally rather astonish my readers, but which will no doubt be highly appreciated by all those who do not scoff at the culture of our material being—I mean *running*—an exercise perhaps superior to all others as regards the advantages to be derived from it.

In the three rooms which I occupy, the distance between the two farthest corners of the first and third is twenty-five paces, so that in running to and fro we may call it fifty paces. Long habit has enabled me to go over the whole space fifty times at a running pace, without experiencing the least fatigue, in from ten to fifteen minutes, according to the speed that I feel disposed to adopt.

Having finished running, as it is not prudent to allow the body to subside all at once into perfect rest, I continue to walk over the distance for two or three minutes, gradually diminishing my pace until the heart has regained its normal pulsations.

Without going back to the history of times long gone by, I am desirous of letting the reader know that we have an example in our own century of the manner in which this exercise is appreciated by the one nation which is, as I believe, the best qualified to establish the rules of all athletic practices—I mean the English. In the two great Universities of Oxford and Cambridge, the students who are chosen as champions for the yearly regatta, put themselves into training for several weeks before the event, and in order to do so properly they have found that running is necessary, that being one of the most, or, indeed, *the* most invigorating of all exercises, so that besides rowing they every day practice also running.

This sort of training may seem excessive to us, little used as we are to these healthy and manly contests, when I say that as regards running as a part of it, the champions of both Universities accustom themselves to run for a whole hour without feeling exhausted, which shows indeed the strength and robustness they have acquired.

Still if in the programme I have above indicated ten or fifteen minutes' running should appear far too much to any one desirous of making a trial, it will be easy to diminish the time to be thus employed, and then endeavour to increase it gradually, say from one minute upwards, so as to reach the limit given,

and then again lessen it, it being a law never to be infringed that we must not practice any one of the above exercises to such an extent as to induce fatigue and prostration. By beginning by very little, and gradually increasing the exertion, the body easily acquires strength and energy sufficient not to feel at all fatigued in going through such exercises as would at first have completely exhausted it. But with all this I do not maintain that it is at all necessary to pass one's life in "training," as the above-mentioned English youths do for a short time.

In making all these remarks I naturally trust to the good sense and discretion of the individual, reminding him meanwhile that the rules indicated are not meant to render the body stronger than just what it needs to be in order to enjoy robust and prosperous health, for to go beyond that would be contrary to my intention.

The last two exercises I go through are the following: First. Placing two chairs back to back, about two feet apart, I use them as parallel bars. Raising my body off the ground, with my hands resting on the top bars and my arms straight, I bend these so as to sink gradually until my knees reach the ground, when I again raise myself up. I repeat these movements up and down five or six times, and even oftener if I feel so disposed. Second and last. I go through an exercise with the weights, invented by Signor Alfredo Mengozzi, the well-known gymnastic master in Leghorn. These consist of iron discs, each having an opening from the circumference to the centre, which allows of their being placed round a vertical axis one above the other, according to the weight required. Of these there are two groups, one for each hand, and each of the groups is attached to one extremity of a cord, which, passing through a pulley at the end of a bracket, terminates in its other extremity in a handle in the form of a stirrup. The two brackets are of iron, and are fixed in the wall about 5 feet from the ground, and about 20 inches apart. I use these weights for one exercise only, which I repeat several times, with each arm alternately. I shall explain this exercise more fully in its proper place, and now merely observe, for the purpose of showing the result one may arrive at, that having begun with a weight of 20 kilogrammes (44 lbs.) for each arm, I can now raise just double the weight, with the left arm as well as the right.

After this I dress and go out to my daily avocations, with my mind as clear and with as juvenile an exuberance of life as if the sixty years which have whitened my hair had stopped at thirty—a fact!

I well understand that, impressed with ideas still prevalent, many will feel disposed to shake their heads and smile almost

with pity, feeling satisfied that to enjoy health and live with physical comfort, there is no necessity to go through all this fatigue. I am likewise convinced that any display of words on my part in order to persuade any one that the practical application of these principles of Physical Education is productive of most desirable and valuable effect, would be a fruitless task.

And be it so! I shall limit myself to simply enumerating the different factors which mainly contribute to our well-being in this life—health, robustness, beauty and elegance of form, activity, and energy. By following my method any one can at any period of his life—and be it remembered that it is never too late—gradually obtain possession of all—or almost all—of these valuable qualities.

I leave it, therefore, to you to decide whether it is worth his while to make a trial.

Moreover, I beg those who should feel disposed to make a trial, to arm themselves with one indespensable virtue, *Perseverance*. In order that these exercises, beginning by very little and gradually increasing so as to include the whole programme, should become a well-rooted habit, and require no strain to practice them, but command, in fact, our predilection so that we cannot cast them aside, many weeks and months, and perhaps years, must elapse; but this ought not to discourage the wise, if thereby a benefit can be secured not only to ourselves but to the whole nation and ultimately to humanity at large.

It is a source of great satisfaction to me to think that a man, whose great and refined intelligence was an object of pride to the commonwealth of the United States of America—William Cullen Bryant* unequalled both as a poet and orator, should have practised a method similar to mine in order to protect and promote his health, and that he should thereby have enjoyed to a great age a flourishing state both of physical and intellectual well-being. He, as an intimate friend of his, Mr. J. Bigelow, has told me, devoted two hours every morning to these exercises, including the time required for the cold bath. I am satisfied with the hour which I occupy in going through the whole of my programme, nor do I find it necessary to prolong it beyond this limit. Many persons, however, may find after fully testing my

* Bryant died four years ago in his 83rd year. Fresh and still young in body and mind, he, after having delivered a speech of two hours to an immense crowd of people, went on foot to a friend's house two miles distant, on a sultry day, and without any protection from the scorching rays of the sun. The consequence was that he received a sun-stroke, of which he died. Bryant and Longfellow have been the two great poets of the Great Republic, and by many the former is preferred to the latter.

method, that they can derive greater benefit in imitating Bryant's example, whilst others will think it advisable to content themselves with what I do—which, to say the truth, is not little. I will add that every one will do well, whilst accepting my ideas, to choose and adapt to his own case the exercises for which he may feel more disposed, when after a whole year's experience he will have been enabled to judge properly—I mean to judge of their *efficacy*; because if he were too soon either to lessen them or augment them, he might be led to do so through mistaken motives—either from laziness, or a desire to obtain too much.

In the last place, I beg to remark that by virtue of this hygienico-gymnastic programme everybody can acquire for himself, and to a great extent also for his offspring, a legitimate title to physical nobility, which in our modern existence is not of less importance than a similar title derived from blazonry or wealth, especially if united to nobleness of heart and intellect, without which, indeed, all kinds of titles and honours are alike vain and worthless.

Detailed Explanations of the above-mentioned Exercises.

Let me first of all indulge in a few remarks about the frictions made all over the body with brushes.

Many persons experienced in the medical art, who have studied the effect of this action upon the skin, look upon it as something hygienic, already well known and largely practised by the English; nor do they hesitate to recommend it as healthy, not only on account of its tonic effect upon the skin, but also because of its efficacy in benefiting the muscular tissue and giving fresh impulse to the circulation. A young and highly-talented physician has investigated the salutary action of this kind of friction, and has led me to hope that he will make it the subject of a lecture, and publish it for the benefit of the public. He has told me that from experiments he has already made he is disposed to adopt brushes made of iron bristles, and I am persuaded that he will offer satisfactory reasons for his preferring capillary wires to the common hog's bristles. Meanwhile those who are disposed to try this sort of "grooming," will do well to begin with soft brushes before making use of such as I employ, which are made of Russian bristles, and are exceedingly rough. I moreover suggest that they should pass them vigorously over the chest and abdomen, between the thighs and all over the legs, not forgetting the feet, which latter being all day in durance vile within the boots, are really

in need of being forced into greater vitality. I also recommend the passing of the brushes several times round the neck, this also being a part of the body that deserves special attention; nor must the arms and arm-pits be neglected, nor the shoulders, nor the whole course of the vertebral column.

Elementary Exercises.

These exercises are usually gone through with a small weight in each hand, called *haltère* in French and *dumb-bell* in English. But as to this every one will do as he pleases. I should feel disposed to recommend their use, because it is a fact that, without requiring much exertion, they tend to give strength and robustness to the arms.

These elementary exercises are multiform, and can be extended to an indefinite number. Everybody can choose from a book on Gymnastics those he prefers. In the meantime I shall here point out those which I have myself adopted.

First Exercise. Movements of the Neck.—I have first of all directed my attention to the movements of the neck, which have a direct influence upon the head and all the noble organs placed in it. The various movements are the following:

1. Movement of the head to the left, turning the face as much as possible in that direction; then movement of the head to the right.

This double movement I generally repeat ten times. Having on one occasion a very bad headache, I derived much benefit from moving my head thus from right to left at least fifty times.

2. The second movement is to bend the head backward and then forward. This also I repeat ten times. Be it understood that the head must first of all be bent backward as far as possible, and then in a similar manner it must be bent forward, and so on.

3. The third movement consists in a rotatory motion of the head from left to right in front, leaning it over the chest and right shoulder, then bending it backwards and bringing it from the right shoulder to the left across the back; then leaning it over the left shoulder, and so on, continuing the rotatory movement without violence but rather swiftly for ten times. After a short pause, the movement should be reversed from right to left in front, and from left to right across the back. This should also be done ten times.

Some teachers have thought—and not without reason perhaps—that this movement would be more properly expressed by the word *circumduction* than by the words *rotatory motion*. What I wish is that every one should have a clear idea of what I mean, but all are welcome to use the words and phrases they prefer.

4. The last movement with the neck, or, as I have said before, with the head, is the leaning of the head first on one side then on the other.

At first these movements will not only appear difficult to some, but they will also cause a momentary giddiness. But no one need be alarmed at this. After the first fortnight the head becomes sufficiently disciplined to triumph over the drawback, and by degrees we understand and appreciate the advantages derived from these exercises. I may here remark that habit has enabled me to go through the rotatory movement as often as fifty times very quickly without experiencing the slightest inconvenience, even when in executing it I happen to keep my eyes open.

After these preliminary exercises I am in the habit of going through other very brief ones, which cannot properly be called elementary, adapted to two iron brackets (wooden ones will answer the purpose so long as they are strong and safe), which are solidly fixed in the wall, about seven feet from the ground and about sixteen inches apart.

First of all I hold on to one of these with my right hand, and from it suspend the whole weight of my body, and then I do the same with my left hand, but each time for only a few seconds. Then holding on by both hands I pull myself up so as to touch the brackets with both shoulders. Letting myself slowly down I resume the pulling up, and repeat it about twelve times. He who has never tried to pull up the whole weight of his body in this manner will probably not at first succeed in doing it, but by forcing himself to it day after day, and by helping himself with the toe of one foot against the wall, the neophyte will gradually be enabled to go through this exercise and repeat it several times. No one can fail to perceive the importance of this feat, as it offers the simplest mode of acquiring strength in the forearms, in the biceps, in the muscles of the shoulders and chest, and of invigorating at the same time those of the hands, fingers, and wrists.

Second Exercise. Movements with the Arms.—We come now to the elementary exercises of the arms. Whoever opens a book on gymnastics will find that these can be multiplied *ad infinitum*, and that in order to render them more efficacious it is generally recommended to execute them holding a dumb-bell in each hand. For my part, however, I have restricted these movements to a small number which I practice without dumb-bells. They are as follows:

Triple movement of the arms above the head, sideways, and

straight in front.—Bending both arms and placing the hands (closed) high on the chest, I jerk the hands and arms upwards so that they reach a perfectly vertical position, and then bring them back swiftly to their position on the chest; next, I execute the second movement, which consists in the simultaneous extension of both arms sideways—that is, the right arm towards the right, and the left arm towards the left—in such a manner that they are horizontal and in a line with the back and with each other; and lastly, replacing my hands—still closed—on my chest, I throw them out in front in a horizontal position and parallel to each other.

These three combined movements, which I have thus reduced to a single exercise, I repeat not less than ten times.

2. *Backward movement of the arms.*—With closed hands again on the breast as starting-point, I twist both fists downwards and give the arms a strong jerk backwards, keeping them parallel to one another, and endeavouring as far as possible to bring them into a horizontal position behind my shoulders. This movement I also execute ten times.

3. *Rotatory movement of both arms forward and backward.*—This movement is not easy for beginners, and it is therefore advisable to train each arm to it separately. It consists in throwing forward both arms well stretched, then raising them over the head—or rather, shoulders—continuing the movement backward and downward, and lastly bringing the arms again to the front, thus making them describe as large a circle as possible. They should be well stretched out all the time, and should be parallel when in front and over the shoulders. This exercise should be repeated ten times, rapidly and with energy.

Then a similar movement is made with both arms in the opposite direction. They are thrown out in front well stretched and parallel, and are then moved downwards, backwards, and upwards, so as to describe as large a circle as possible. This should also be done ten times.

In these movements the hands may be kept open or closed. I prefer keeping them open, and turn or twist them from right to left and from left to right in order to exercise the muscles of the wrist.

THIRD EXERCISE. MOVEMENT OF THE TRUNK.—These exercises ought indeed to be called by their right name—movements of the spine—because it is the spine which is particularly benefited by them.

1. *Bending the bust forward and backward.*—Bend the bust forward and downward so that the tip of the fingers may reach down as near as possible to the toes, holding the arms well stretched and parallel to the legs; then raise the bust, and

holding up the arms, bend backwards, the head following the same movement, and the arms in the most convenient position, either stretched out backwards, or hanging loosely by the side. The knees must not be bent—at least, not when the bust is curved forward. When these movements have been repeated three or four times with energy, it will be found that the muscles have acquired sufficient elasticity to allow the hands to reach the feet. I, for instance, from long habit, can now touch the ground with the palms of my hands without in the least bending my knees, but holding the feet about ten inches apart, for with the feet close together the said movement is almost impossible.

I recommend that in bending the bust backwards, the spine should be curved as much as possible; and you will easily see why I insist upon this, when you consider that in the common habits of life we have frequent occasion to stoop forward, while it is but of rare occurrence that we find ourselves obliged to bend our body backward.

2. *Bending of the bust down sideways, first to the right and then to the left.*—In bending the bust sideways to the right, you must endeavour to reach with the right hand as far down the right leg as possible without bending the knee. The head should lean over as much as possible on the right shoulder, and the left arm should be arched over the head. A similar movement should next be executed with the bust to the left side, the left hand reaching as far down the left leg as possible, the head leaning on the left shoulder, and the right arm arched over the head.

3. *Turning or twisting the bust to the right and left.*—With both hands on the hips and the elbows turned backwards, so as to expand the chest as much as possible, turn the bust vigorously to the right, and then returning to the normal position turn it with equal vigour to the left. The head must remain motionless, looking straight forward. This double movement, like the others, to be repeated ten times.

4. *Rotatory movement of the bust.*—This movement consists in bending the bust forward, then bringing it to stoop over the left side, then continuing the movement backward, so as to bend the bust as far back as possible, then still continuing the same impulse, bend it over the right side, and from this position bring it into the first position of stooping forward, thus completing the rotatory movement. It is well to continue this movement three or four times and then reverse it, bending the bust over the right side, then backwards, then bending it over the left hip, and finally bringing it into its first position in front. The head should follow all the phases of these movements, and the hands should be joined behind the back.

These four, or rather eight, different movements of the bust have, as I have before said, a direct action on the spine, or to express it better, on the cartilages connecting the vertebræ, and tend to keep their activity and increase their elastic qualities, thereby rendering every movement of the body easier and more elegant, and maintaining in full health the vertebral column in which so much of our physical life is centred.

FOURTH EXERCISE. MOVEMENTS OF THE LEGS.—1*st Movement*:—Raise the right knee as high as the shoulder, keeping the tibia perpendicular to the ground; bring back the leg to its normal position and execute a similar movement with the left leg. It will seem, and really is, difficult to touch the shoulder; or rather the upper part of the deltoid with the knee, but by practising the movement day after day the muscles gradually stretch, and we find at length that we are enabled to do it without any great effort.

This movement, as well as the others I shall here indicate, should be repeated at least ten times.

2*nd Movement*.—Raise the right knee again to the shoulder, throw out the leg horizontally and well stretched, then bend the leg downward and jerk it backwarks vigorously (as if giving a kick) and endeavour to raise it as near as possible to a horizontal position behind the back. Then, bringing it back to its normal position, strike out with it to the right, also endeavouring to bring it into a horizontal position, then letting it resume its normal position, you execute the same movements with the left leg.

In these 1st and 2nd movements, care must be taken to keep the foot bent so as to be as nearly as possible in a straight line with the leg, because if the foot be kept at right angles with the leg when in action, the movements appear clumsy and devoid of grace, or to be more explicit, vulgar.

3*rd Movement*.—Bend both knees and let yourself down until the haunches come in contact with your heels, and then raise yourself up again. In executing this movement you must first of all raise yourself on tiptoe and separate the knees more and more as you go down. This movement is one of the best adapted for strengthening the muscles of the legs and thighs, and may well be repeated more than ten times.

4*th Movement*.—Place your feet apart, say about 30 inches, and bend the right leg so as to allow the haunch to come in contact with the heel, and at the same time stretch out the left leg as far as possible, keeping the sole of the foot on the ground. Then spring up quickly and vigorously, and make a similar movement by sinking on the left leg, stretching out the right foot, and again springing up. Continue these alternate movements ten times with each leg.

In these movements, as in the preceding one, care must be taken to raise the heel off the ground and remain on tip-toe, with the foot of the leg that is bent down, in order to render the exercise easier and more graceful. This movement is rather difficult to accomplish at first, but with a little patience and perseverance you will find that continued practice will soon render it very easy, because all the muscles employed will obtain by degrees the necessary strength and energy. This movement is even superior to the preceding for giving strength and power to the legs.

FIFTH EXERCISE. RUNNING.—It is not unnecessary to say a few words about this exercise, which, although accomplished simply with the legs, has nevertheless a direct influence on the entire organism. It is an excellent discipline for the heart and respiratory organs, and is the best for attaining that force of resistance which constitutes true vigour and robustness.

Anyone who takes these notes of mine into consideration, and who feels disposed to practise the exercises I am describing, must shorten or lengthen this particular one according to his own constitution; still I advise him not to allow himself to be influenced on the one hand by laziness, or on the other by impatience, which may easily result from a too-prolonged exercise. And I say this because all the foregoing exercises, being of short duration, and this one forming an exception, it naturally disturbs the acquired habit of passing rapidly from one to the other, and consequently from its being out of the common routine, is liable to prove irksome and tedious. In this instance, also, through patience and good-will we may get accustomed to count without a grudge the long minutes that a little healthy running occupies. I have reconciled myself without regret to the ten or fifteen minutes which I every morning dedicate to this hygienic discipline; and, indeed, I believe that anyone may, through a little effort of the will, force himself into following my (not bad) example, as he will be able to comfort himself with the idea of thereby obtaining a no slight advantage in the energy and health of the whole frame.

SIXTH EXERCISE. MOVEMENTS WITH CLUBS.—Persian clubs afford the means of making some of the healthiest exercises, having a direct action on the most vital parts of our physical structure, on the jewel-box—the chest, and all it contains. The Persians, though inhabiting a warm climate, owe their strength and vigour to this simple exercise.

In England, France, and Germany, several works have been published respecting this gymnastic apparatus. Some prefer a single club, and with it exercise one of the arms at a time; others have decided in favour of the simultaneous use of two

clubs of equal size. I have chosen the latter method, and of the infinite number of exercises have selected and practise only a few of the simplest. My clubs measure about 30 inches in length, and do not weigh more than 17 pounds. In shape they resemble an elongated bottle. They are made of ilex wood and are loaded with lead at the bottom so as to give them the requisite weight.

1*st Movement. Raising both clubs to a horizontal position.*—Place the clubs upright before you on the ground, grasp the handle of each with the corresponding hand in the same way as you would the hilt of a sword, raise them up horizontally in front of you, holding them close together; then separate the arms until they as well as the clubs are on the same line with the shoulders—the right arm stretched out to the right and the left arm to the left (thus forming the figure of a cross); then lower the clubs gradually and place them upright on the ground, one near each foot.

This movement is rather difficult, and cannot be mastered without much preparatory exercise, and I should therefore advise any one who wishes to succeed in it to begin by practising the movement with lighter clubs, and to gradually increase their weight; and this suggestion holds good for all the club exercises which follow.

2*nd Movement. Rotatory movement of both clubs round the head, beginning in front.*—Take hold of the clubs as above, one with each hand, raise the right arm over the head holding the club as nearly perpendicular as possible, swing it round behind the left and right shoulders back again in front, and continue the rotatory movement. Meanwhile a similar movement is being executed by the left arm, which swings the club over the head and behind the right and left shoulders. The movements are timed so that the clubs pass over the head alternately. This feat is very easy, but care must be taken to begin with the left arm when the right is already in motion, and at the precise moment when the right hand club is rounding the middle of the back. This simultaneous movement of the two arms and clubs can be repeated ten times or more as one may feel disposed.

3*rd Movement. Rotatory movement af both clubs round the head, beginning from behind the back.*—This movement is similar to the preceding, with this difference, that instead of swinging the clubs round the head alternately with the right and left arm in front, the right arm must be raised, first making the club pass backwards round the right shoulder over to the left across the back, bringing it round in front to its first position by the side of the right leg, the rotatory movement being continued over the head. The club must be kept in a perpendicular position as far as possible.

It is prudent with heavy clubs not to have both arms in motion simultaneously, the movement being rather a strained one and apt at first to cause the clubs to strike against each other. I should therefore advise the movement to be executed eight or ten times with the right arm, and then twelve times with the left, it being always well to give the left arm a little more exercise in order gradually to make it as strong as the right.

4*th Movement. Another rotatory movement of the arms.*—Raise, or rather swing, the right arm and club straight in front, so that the arm and club form a straight line, raise both swiftly to the vertical position, continue the rotatory movement straight behind, downwards, past the right leg, and so on for five or six revolutions. The same must be done afterwards with the left arm and club seven or eight times, for the same reason as above given, namely, to give more power to the left arm.

It stands to reason that this movement cannot be executed by both arms at the same time, because in order to accomplish it properly with the right arm you must of necessity move the right shoulder forward and the left shoulder back, while in doing it with the left arm each shoulder must make the contrary movement. If, therefore, both arms act at the same time, the exercise can only be imperfectly performed, and with heavy clubs it would certainly be dangerous. Even without clubs it can only be imperfectly performed with both arms simultaneously, as neither arm can, if moving *pari passu* with the other, ever reach the vertical position over the shoulder. You will thus see that this rotatory movement must first be done by one arm five or six times, and then by the other.

5*th Movement. Last Rotatory movement of the arms.*—This exercise is similar to the preceding one, with this difference, that instead of swinging the arms and clubs forward you must swing them backward. First swing the right arm and club rapidly backward and round so as to pass perfectly perpendicular over the right shoulder, continuing the rotatory movement five or six times. The arm should be well stretched out, and should always be in a straight line with the club. Proceed similarly with the left arm and club.

6*th and* 7*th Movements.*—These are simply a repetition of the two elementary movements of the legs which, in this case, are rendered more difficult by the additional weight of both clubs, which are held suspended perpendicularly one in each hand, the arms being stretched out in front.

Twenty-five years ago, after carefully examining and testing for more than a year all the movements that can advantageously

be performed with the clubs, I determined to restrict them to those which I have endeavoured to explain. I do not, however, pretend that my choice is the best, and everybody will do well to choose for himself any other movements which may be more to his liking.

SEVENTH EXERCISE. RAISING WEIGHTS BY MEANS OF PULLEYS AND CORDS.—This arrangement of weights and cords is the invention of Professor Mengozzi, Director of the Gymnastic Society of Leghorn. By its means many different exercises can be performed, all of which have their peculiar effect on the muscles of the arms, chest, and shoulders, while at the same time they call into play the muscles of the legs, and have a healthy action on the spine. After having practised them all I decided on limiting myself to one for my daily programme for the dressing-room.

These weights rest on the floor, and are raised by means of small ropes which pass through pulleys suspended at the end of two iron brackets, firmly fixed in the wall, about five feet from the ground, and about twenty inches apart. These small ropes end in two wooden handles, one for each hand. The cords are about ten feet in length, so that when performing the exercises you stand about five feet from the wall.

The first movement is performed with the right arm. Place your right foot forward, and planting your left foot firmly on the ground, about three feet behind the right, lean against both handles held tight, one in each hand, the arms bent, the elbows by the side, the hands about the height of the shoulders, and in a line with the chest, and the rope passing outside the arm. Now thrust forward vigorously the right arm as far as possible, bending the body forward at the same time, and the weight is raised off the ground. The left arm, meanwhile, rests passively against the other handle and rope.

Raising the body slowly, and bending the arm equally slowly, the weight is gently lowered to the ground, and the arm, hand, and handle, resume their first and normal position. This movement can be repeated five or six times as one is disposed.

The second movement is made with the left arm. The left leg and foot are put forward, and the right foot is placed about three feet behind the left. Then the left arm and hand are thrust forward in the manner indicated above.

I have always been in the habit of performing this movement three or four times more with the left arm than with the right. In the usual habits of life the right arm and leg are called into action much more frequently than the left, and it is well to give the left side a chance of obtaining a more equal share of strength and development.

I began this exercise with only 45lbs. for each of the weights, but I gradually increased them until I stopped at 90lbs., and it seems to me that I can now raise this weight with the same ease as I at first raised the half of it. I believe that, if we wished to do so, we might train the arm so as to lift much heavier weights still, but I should not deem it prudent for anyone to go beyond the above limit which I have drawn for myself.

There only remains for me now to indicate the series of movements which I have found it useful to practice in bed, lying in a supine position. I hope I shall succeed in describing them so that the reader may easily understand them, although the task appears to me rather a difficult one.

These movements are fitted to call into healthy action almost all the muscles of the body, beginning with those of the feet, legs, thighs and hips, and ending with those of the abdomen, chest, and arms, shoulders and neck.

FIRST EXERCISE.—At night after having performed all the customary ablutions and after having "groomed" myself with hard brushes from head to foot, so that I at last enjoy the most agreeable luxury of stretching myself out all clean in bed, lying down in a position similar to that of the Egyptian mummies, I begin with the hygienic exercises of the legs. This consists in first elongating as far as possible the left leg and shortening the right, as far as the limited play of the hip will allow of; and then *vice versâ*, elongating the right leg and shortening the left one.

These alternate movements must be done with rapidity, allowing at the same time the muscular masses of the abdomen to participate in the movement.

I have got into the habit of making 300 such movements with each leg, and I can aver that it is with some difficulty that I check myself from going through a greater number, but as we must draw a reasonable line in all such exercises, I have not thought it advantageous to do more.

SECOND EXERCISE. *1st Movement with the feet.*—Stretching both feet downwards so that they are in a line with the legs, separate them at the toes and touch the bed on each side with the little toe of each foot, thus bringing the feet into a position at right angles with the legs and in a line with each other; then raise the toes from the bed and bring the feet together, endeavouring to make as small an angle as possible between each foot and its shin-bone; lastly, stretch them out again downwards, and repeat this rotatory movement five, ten, twenty, or even thirty times.

2nd Movement.—This consists in executing a rotatory movement in the opposite direction to the above-mentioned, namely,

placing the feet side by side in a perpendicular position, then separating them as before, right and left, so as to touch the bed with each of the little toes, joining them again well stretched out downwards and in a line with the legs, and then raising them again to their first position perpendicular to the bed. This movement should be repeated as often as the preceding.

These movements tend to promote elasticity in muscles that otherwise are rarely brought into action.

THIRD EXERCISE.—This exercise calls into action all the muscles of the feet and legs.

Placing the feet side by side in a vertical position, with the legs joined and well stretched out, render all the muscles of the thighs, calves of the legs, and feet as rigid as possible for a second or two, and then relax them. Continue this alternate action as many times as you feel disposed. I am in the habit of doing it a hundred times without feeling at all tired.

FOURTH EXERCISE.—Movement of the legs imitating the action of swimming on the back. This is very hygienic and can be repeated as often as one likes—say twenty or thirty times.

FIFTH EXERCISE. 1*st Movement of the arms.*—Extending the arms along the sides, with the hands well shut by the side of the hips, press the fists on the bed, the knuckles downwards, and endeavour to raise the bust, slightly arching the back inwards; then returning to the normal position, turn the fists, knuckles upwards, and repeat the movement of raising and arching the bust. These alternate movements should be continued at least twenty times. I habitually repeat them fifty times without feeling at all inconvenienced.

SIXTH EXERCISE. 2*nd Movement of the arms.*—Continuing to keep the arms perfectly straight, but opening the hands and placing them alongside the hips, raise the right shoulder towards the right ear, and at the same time lower the left shoulder as far as possible; then lower the right shoulder and raise the left. Continue these two movements as rapidly as possible a good many times. I myself repeat them a hundred times.

This exercise is of considerable benefit to the muscles of the chest and shoulders, and is fitted also to give tone to the liver and bowels from the slight movement which is given to them.

SEVENTH EXERCISE. *Movements of the neck.* 1*st Movement.*—Turn the head towards the left shoulder so that the left ear touches the pillow, then moving or rolling the head against the pillow slantingly downwards raise it to the supine position. Then execute a corresponding movement towards the right, turning the head so that the right ear touches the pillow; complete the rolling movement as before, and raise the head to the supine position. Repeat these movements as often as you feel disposed. I generally do it thirty times on each side, but for a beginner five times is perhaps enough.

2*nd Movement of the neck.*—Bend the head forward as much as you can, then raise it up again and bend it backwards and downwards on the pillow, as far as possible. This movement may also be repeated five times by beginners.

3*rd Movement of the neck.*—This movement consists in holding the head supine, and bending it as far as possible first towards the left shoulder and then towards the right. This double movement may also be repeated at least five times.

The above movements tend to impart strength and elasticity to the muscles of the neck, and also to the upper part of the vertebral column, and they have moreover a healthy influence on the membranes and muscles of the brain, because everything that tends to slightly agitate all parts condemned to inertness produces a tonic effect which increases vitality and brings health and prosperity to the part acted upon.

EIGHTH AND LAST EXERCISE. *Movement of the Abdomen.* This movement is performed in the following manner: maintaining the shoulders in their position, and lying supine, endeavour to turn the abdomen as much as possible towards the left side slightly raising the left hip; then returning to the normal position, go through the same movement towards the right, slightly raising the left hip. These movements must be effected with much energy, and can easily be repeated twenty times with much benefit to the peritoneum and all the viscera.

When all these exercises have been gone through the whole frame experiences a feeling of contentment and comfort, which proves their opportuneness and efficacy.* To cite my own experience, I may say that when I have thus gone through the whole of my small programme, it really seems to be as if every part of my organism rejoiced and said, "Thank you! thank you!"

This kind of exercise I have not found in any work on gymnastics, and I am confident that some medical men, prompted by a genuine feeling of philanthropy, will find in them something useful for their patients, in order to render their convalescence shorter, even if they do not suggest them for their tonic effect to people in perfect health. At all events I very much desire that persons more expert than myself in these matters should test them and draw up for the benefit of

* I also go through all these movements, but for a smaller number of times, when I return to bed in the morning, after my cold bath, in order to obtain a more rapid and more thorough reaction.

mankind a scientific treatise respecting them, with all the modifications they may deem it proper to introduce.

Let me now recapitulate in figures what I do on an average in the course of a year, for the purpose of keeping up the symmetry of my bodily frame and endowing it with robustness and health. It is a sort of statistics which may have some interest for those who direct their attention to Calisthenics and Hygiene.

The following is the list:—

200 miles running.
4,000 leaps (standing leaps).
150,000 movements of the legs.
50,000 „ „ arms.
100,000 „ „ neck.
40,000 „ „ bust or vertebral column.
4,000 times I have pulled up my body with my arms: that is, I have raised in all 800,000 lbs. a height of about two feet.
300,000 lbs. I have raised with Mengozzi's apparatus a height of three feet from the ground.
200,000 movements I have made with the clubs, which answers to raising 300,000 lbs. a height of three feet.

But these figures are not given as a standard, and I say this so that no one may feel alarmed. Even in doing one-fifth of the exercises I have here enumerated, many persons would find that they are going beyond what is actually necessary to promote and maintain in their body the robustness, elasticity, grace, symmetry and health requisite for the full enjoyment of existence. But on the other hand to abstain entirely from all hygienic exercises, as is too frequently and, I may say, generally the case, and actually do nothing for the culture of our body is, I repeat, a great blunder in our present civilization—a defect and a void which must be corrected and filled up during our present progress on the higher plane of thought and knowledge.

It will be easily understood that all these movements, each of which is specially intended to benefit some particular muscle or group of muscles, must necessarily exercise a useful influence on the entire organism. This has been the case with me, as any one skilled in physiology could at once verify by closely examining the healthy and vigorous state of my whole body.

The unprejudiced reader will doubtless comprehend that the time thus expended in cultivating the body, brings advantages that no one can despise or make light of, when he considers what the happiness of our present existence depends upon, and how valuable are all those means which ennoble our coporeal frame and promote its wellbeing. In conclusion: *nothing for*

nothing in this world; and whoever has at heart the happiness of his own being will not hesitate, I believe, to devote daily a small portion of his time to consolidate his health and render more perfect his material frame.

And here this brief treatise on *hygienico-gymnastic exercises in the bedroom* might close. I am, however, desirous of adding a few remarks.

Italy is a land known to the world for the high intellectual powers of her inhabitants, and this is not the mere fancy of those who pride themselves on having been born under her brilliant sky, but a fact which history proves to every thinking mind. Relying with much inward satisfaction on this fact, I feel encouraged to hope that this modest paper will be understood and appreciated by my countrymen, and that a goodly number of them will follow out, if not in its entirety, at least in a certain measure, what I have submitted for consideration.

I hold, indeed, that if my words met with benevolent attention throughout the whole of our Peninsula, this country would, in the space of a few years, rank as the first in the world, because it would be peopled with men who, besides possessing superior intelligence and genius, would also possess more health, more robustness, and more energy than any other branch of the human family.

But I well know that this is not to be hoped for. The world follows promptly every whim of the goddess—Fashion; but to change habits in order to comply with the injunctions of the best and most practical reform which concerns the health and happiness of humanity requires time, as it invariably meets with a host of opponents. This seems, indeed, to be a law of nature, in order perhaps that man should not too quickly reach the goal of his destinies in this sublunary sphere.

If we consider why Fashion has such irresistible force, we find that the secret motive which all men for the most part obey is not Utility, but Vanity. In the present case I feel I can also invoke the aid of this irresistible power, inasmuch as these hygenico-gymnastic exercises have assuredly the effect of ennobling and embellishing the human frame.

And here I cannot help expressing a heartfelt wish which I hope will not be allowed to pass unobserved. This wish concerns the gentler sex—our companions in this existence, to whom Nature has confided the sacred duty of perpetuating our species. My earnest desire is—that a skilful female teacher of the gymnastic discipline should conceive the happy idea of writing an essay which should be serviceable, not only to young women, but to women of maturer age, in showing them how to improve and invigorate their frame, so that their offspring

may thereby be benefited. If such a work, coupled with a name of some authority, could see the light of day in Italy, it would cause a great awakening. It would exercise a most favourable influence on the gentler sex throughout our Peninsula. I should rely on *their* good sense for giving such a book the consideration it would deserve, and am confident they would make it a duty to follow out its precepts, certain as they would be to derive from them immediate advantages superior to all else that captivates their vanity in the fashions that come to them from beyond the Alps. No dress, however splendid and becoming, will ever add more to their charms than would the properly practised rules of well-chosen gymnastic exercises, these alone having the power of ensuring to them the florid, elegant, æsthetic and winning appearance, which ever accompany prosperous health, robustness and elasticity of the whole frame (See page 181).

If, instead of wearing garments of silk and satin, which often serve as the white-washed walls of sepulchres, to cover what is hideous with a false appearance of brightness and beauty, everyone were obliged to show himself or herself to the public gaze with the only covering nature has provided us with—the *bare skin*, I feel pursuaded that the magnificent carriages which every day convey persons, more or less conspicuous, to the Bois de Boulogne or Hyde Park, would be filled with people who, with the greatest scruple and the most untiring patience, would daily practise all that I have here pointed out, as no one would then wish to submit to the humiliation of showing himself or herself inferior to others in point of physical education and refinement.

But such is not the case, nor is it likely it ever will be. In this connection I beg to be allowed to mention a trifling circumstance which struck me very much when I was a child. An English gentleman wishing to change his coat for a lighter one on account of a variation in the weather, asked his servant, in my hearing, if he had cleaned it properly, to which the latter replied that he had brushed it well. "But," inquired the Englishman, "have you turned the sleeves inside out so as to brush off the dust inside? If you have not, do so at once, for I prefer having my clothes cleaner inside than out."

This idea of scrupulous cleanliness (rather exaggerated in this case, however), pleased me as a principle, and I have not only kept it in my memory but I have also acted upon it. And why, I ask, should we not endeavour that all that remains hidden from view should be kept in a state of perfect cleanliness and æsthetic beauty?

Answers to this query would be rather amusing, I doubt not,

if we could only obtain them genuine. The majority would limit their response to something like the following:—"You are, indeed, a curious fellow. It is not likely, indeed, that I should go out of my way, and take so much trouble about all that remains unobserved, and that nobody has any curiosity to inspect! If my dress is decent outside that is all that is needed, as I have, thereby, paid my tribute to respectability." But other individuals, misshapen by fat, with stooping shoulders, and with a face bearing the expression of sloth and effeminacy, would blurt out—"Just imagine if we are likely to place our dignity in jeopardy by running, jumping, and turning and twisting, about in such an odd fashion! Go among the Zulus: they are the people to appreciate your advice!"

There are those, however, who, versed in pathological science, might bring some rational objection, likely indeed to convince the many. They might say, for instance, that after a certain period of life any pretensions as regards strength and agility are injurious to the health, and that the majority of those who should allow themselves to be won over through my words would pay rather dearly for their imprudence—and justly so—and dig their graves before the time.

The very example of the Argyrasps already referred to stands out as a proof that this assertion is a lame one. The Argyrasps were men of between 60 and 80 years of age, who in military discipline and military exercises, in sustaining the fatigues, discomforts, and hardships inseparable from long marches, and in hardihood and firmness on the battle-field, proved themselves superior to the men belonging to the younger phalanxes.

In the "Lives" of Plutarch we also find examples of illustrious men who having passed their 50th year were as strong and active as any young warrior.

In our own day it is not uncommon to remark the vigorous and enviable state of health of those who, at an advanced age, have continued to devote themselves to hunting and sport; and this offers an undeniable proof that exercise, even when violent, is productive not only of no harm but indeed of much good to those on whom the winter season of life shows white upon the head.

To such opponents I may, on the other hand, observe that, as I have already said, my programme is not to be followed out fully and at once but by degrees. I will also add that they who, having accepted my advice, should succeed in going through all the exercises I have above indicated and should wish to continue them as an excellent method of preventing all kinds of illness, must nevertheless not always repeat them *in toto*, unless they experience a positive craving in the muscular

system to go through the whole programme. It is useful and wise to change at times the above exercises; that is to practice more especially some for a time and neglect others, and then take up the latter and neglect the former; or proceed as is done in the "arsenic cure"; that is begin with very little, gradually extend the programme until it includes all the exercises, and again descend by degrees to the elementary movements. In this way every one will have it in his power to derive benefit from this discipline, and medical men, who generally know next to nothing about the therapeutics of the gymnastic art, will be greatly astonished to witness the metamorphosis which will have taken place in the organism of the neo-gymnast, no longer their patient.

I could mention many facts, but the history of my own case is sufficient.

I venture again to assert that, unfortunately, few medical practitioners have from their own experience any knowledge of the tonic and healing effects of educational gymnastics; and it would be for the good of humanity if the medical student, in order to obtain the degree of doctor, were obliged to be fully cognizant of the value of physical education, and submit to a severe examination in all the different branches of its teachings

Most illnesses have their root in the inertness in which our organism is, in accordance with modern habits, for the most part condemned to languish. Inertia impedes and corrupts the regular functions of our bodily mechanism, especially if coupled, as it generally is with over-abundant nourishment. Our modern followers of Æsculapius could therefore do nothing better than, having first through their own experience, convinced themselves of this truth, prevent sickness by inculcating the principles and practice of physical culture, which constitutes an invaluable panacea.* But—and it can easily be surmised that the "but" I am about to give utterance to is indeed a terrible one—but of what use would the healing art become if everybody knew, appreciated, and applied this easy, and I may say recreative mode of preventing illness of almost every kind? I leave it to you to meditate over this query, and to tell me if this state of things be not an anomaly in our present civilisation.

* I feel obliged to apologise for these words of mine to many excellent physicians who have of late years afforded brilliant proofs of how they appreciate the great advantages to be derived from physical education, that is, from gymnastic exercises, by people both in good and ill health, and particularly by children affected with *rachitis* (rickets); and I cannot help mentioning, as worthy of public esteem and gratitude, Professor Alberto Gamba, of Turin, who deserves well of his country for the humanitarian feeling which prompted him to initiate the cure by gymnastics of children affected with rickets, and who has earned imperishable fame by the splendid results he has thereby obtained.

The medical art has indeed no interest in preventing diseases, nay, every effort made in this direction is necessarily hostile, not to say fatal to its object and ministrations.*

It were vain for me to prolong my discourse on this point, and I therefore leave it to every one to make the use he likes of my words. Certain it is that since the beginning of this century great strides have been made respecting the culture of the body, and that even in this country (Italy) this idea has also gradually developed, so that we may be justified in hoping that we are nearing a time in which we shall be on an equal footing in this respect, not only with Germany but also with England herself.

Our present Minister of Public Instruction, a man well known for his eminence in science, will, we trust, give a fresh impulse to the ideas and principles of which Francesco de Sanctis was the promoter, if he determines on calling to Rome some of the more authoratitive devotees to gymnastic discipline, in order to consult them. And I say this because men who have thoroughly studied Physiology—one of whom is our Minister, Baccelli— are too apt to think that the light of such Science is sufficient to enable them to know all that is required in order to educate our organism in such a manner as to endow it with the necessary vigour and robust health; whereas Physical Education is too complex a matter to allow of the rules by which it must be guided to be easily established, without consulting those who have grown grey in making it their special study. I, for my part, who have always been particularly devoted to this branch of education, should wish that the Minister for Public Instruction would appoint a Commission of three persons to visit Switzerland, Germany, Belgium, Holland, Denmark, Sweden, France, England, and the United States of America, inspect every college, lyceum and university, and also all the most noted gymnasiums, and on their return home draw up a report of all that Educational Science has tried and found expedient in these parts of the world, in order to bring, as far as possible, to perfection the human frame of both sexes.

In this manner our Minister would easily be able to judge what had best be done in order that our ancient race should, through this bodily discipline, obtain the elements requisite for being, even in our present period, second to no other on earth. He would, to my mind, be accomplishing an act of the greatest

* A medical man, my intimate acquaintance, to whom I expressed these ideas, accusing him of cynicism because he was loth to recommend hygienic gymnastics, for fear it would "frighten away birds from his trap," answered me thus: "Well, after all, we can even allow the practice of gymnastics, for when we consider that a single dancing-party is enough to afford us food for a whole year we ought to be well satisfied."

patriotism, which would speedily realize the wish expressed by Massino d'Azelio: "*Now that Italy is made, we must make the Italians to suit it.*"

Some five or six years ago Disraeli, in one of his speeches in the British Parliament, said, "that, after all, the first people in the world would be the one possessed of the greatest amount of health." Physical Education, well understood and well applied, is alone fitted to realize this idea and endow a nation with this pre-eminence; especially if, together with its teachings, we enforce also—and sooner or later we must come to this—the study of Hygiene and Physiology.

I cannot, however, help repeating here what I have maintained on other occasions, namely, that methodical gymnastics cannot solely and alone educate the youthful frame in a way best suited for all the requirements of practical life; there are other exercises which are equally needful in order to promote robustness and energy, and they, too, must be taken into account and practised alternately with gymnastics. I mean such recreative games as are largely practised in England in all the schools throughout the kingdom—games which have the effect of rendering boys daring, fearless, hardy, and self-reliant. This is the great secret of British Education, and it would be well that Italy should adopt it, without, however, neglecting the teachings of gymnastics, which tend to the more symmetrical development of every part of the body. These violent struggles (such games *are* violent struggles), besides engendering, I say, strength and valour in the body, also tend to form the character endowing youth with moral energy and self-reliance. By their means boys learn to prefer all that is manly, courageous, and noble, to what is artificial, small-minded, and vile.

We live in a period of transition. The ideas of the past are fast disappearing with the dismal night whereon the words, "Ignorance, Privilege, Slavery," are still legible, and a new era is being inaugurated, inscribed with the brilliant legend, "Light, Brotherhood, Freedom."

To quote Gabriele Rosetti's beautiful lines:—

"Sei pur bella con gli astri nel crine
Che rifulgon quai vivi Zafliri;
È pur dolce quell' aura che spiri,
Porporina foriera del dì!"

Which we may translate thus:—

How beauteous, crowned with stars that shine
All vivid like the sapphire's ray—
How soft and pure the air of thine,
Thou roseate herald of the day!

Our modest voice in favour of Physical Education is in full harmony with this splendid herald of the coming day. Whereas in the past, ignorance and tyrany wished to keep men poor both in body and mind; in the era we are now entering upon, man must prepare for the battle of life by equipping himself with vigour and perfection of frame as well as with nobleness of mind and heart. It is the *whole man* that is now demanded—man in full possession of all his attributes and faculties, for thus alone can he be in harmony with the new order of things.

It is a source of satisfaction for us Italians to know that we descend, with more or less of mixture, from a powerful race—a conquering race, perhaps the bravest and most gifted of all, and that it is but necessary to stir the still smouldering embers in order that our race may regain possession of its former virtue and worth.

My task is done.

APPENDIX.

The Physical Education of the gentler sex being also a primary question, I may be permitted to reproduce a portion of a paper on Gymnastics which I read before the Philological Society in Florence on the 12th of May, 1879.

And here in connection with the subject of Gymnastics for females, I feel bound to mention a female school which is unique in the world, namely, Vassar College, on the banks of the Hudson River, about 50 miles from New York. Vassar College was built by Matthew Vassar, who, having no children, devoted his riches to endowing his native country with this model school. He travelled much all over Europe, visiting the most renowned female institutions, and on his return home to America, bought a large piece of land on the Hudson, and founded this educational establishment for young ladies, where a complete moral and intellectual education is given hand in hand with an equally complete education of the body. Thus in the spacious park which surrounds the building there are a magnificent gymnasium, a riding school provided with excellent horses, various lawns for recreative games adapted for young ladies, and various artificial lakes for swimming, rowing, and skating. In this school there are now 500 pupils, and as soon as there is a vacancy it is immediately filled up, for the applications for admission are counted by the hundred.

Would that a second Duke of Galliera would endow Italy with a similar college for young ladies! Many suppose that physical education is not proper for the gentler sex. This is a sad mistake. Woman is intended by nature to become a mother, and if she be not in a vigorous state of health her offspring cannot but pay the penalty. It is the duty of all of us to devote our best care to rendering our body as healthy and perfect as we can, but that duty is undeniably paramount in woman.

Eugene Pay, the well-known and renowned French gymnasiarh, observes: "That we find in Genesis that God created woman from a piece of flesh taken from Adam; but that in our actual life the reverse is the case, inasmuch, as everyone knows, it is from the flesh of woman that the embryo develops and becomes a human creature: and it thence follows that it is woman's sacred duty to be brought up so as to be possessed of florid and robust health."

He then adds that women must practise gymnastics if they wish to be "healthy, well-developed, graceful, vigorous, and, especially *handsome*."

I repeat that I wish there were in Italy a Vassar College, as we need henceforth that our women should be educated so as to fully discharge their mission.

SECTION II.

ENGINEERING AND ARCHITECTURE.

ADDRESS

By Professor Roger Smith, F.R.I.B.A.,

PRESIDENT OF THE SECTION.

In opening the proceedings of this section, I propose to address some remarks to you on a subject which I trust you will feel to be, at any rate, an appropriate one, and one suggesting many topics, namely—London dwellings. And I have selected such a subject in preference to attempting a general review of the wide field presented by the sanitary aspects of architecture and engineering, believing that the more limited task was one which I could better perform, and that perhaps for once, as a change, it might not be unacceptable to yourselves.

The capital of Great Britain is the most remarkable city of the world for wealth, influence, and extent. Its population equals that of a province, and is singularly well situated for scientific observation on account of its concentration, and of the comparatively uniform conditions under which it is placed. The sanitary state of London will always, for these reasons, attract marked attention. Nor is it devoid of personal interest to most, for there are very few even of those living elsewhere, who have no friend or relation among the vast crowds drawn to the capital by that strange attraction, resembling that of a loadstone, which it exerts over every part of the country.

Lastly, I may as well confess that the subject has suggested itself to me very much from the fact that it has been my lot to live and work as an architect in London for a good many years so that the dwellings of London people, rich and poor, have become familiar to me, and I may be able consequently to speak from personal experience.