success of many of Pasteur's experiments in other maladies. The theory is that by a process of cultivation a benign form of germ may be obtained which, without producing much disorder, effectually sterilises the blood of the individual towards the real morbific germ. The experience in the case of small-pox showed that even direct inoculation produced a milder form of the disease than when it was taken by infection in the ordinary way. It is possible that the mere passing from person to person may to some extent attenuate a virus, and ultimately lead to the cessation of an outbreak, although there is also the powerful factor of the exhaustion of susceptible victims. The system of small-pox inoculation was certainly a benefit to the individuals, but as furnishing fresh centres of infection it was a doubtful benefit, if not a positive evil, to the community. It is the presence of equally great protective power, combined with the absence of any power to infect short of direct inoculation, that constitutes the great value of vaccination; and Pasteur, in recognition of the value of Jenner's great discovery, has used the word as a general term to express prophylactic inoculation of any kind. I am not going to enlarge upon this subject here, but I hope opportunity may be found to discuss it in the section of preventive medicine. I take, however, this opportunity of making it distinctly understood what my views are—viz., that vaccination is one of the greatest boons ever conferred upon humanity, and in saying this I believe I express the views of the council of this Institute. This town (Leicester) has constituted itself a principal centre of opposition to vaccination, and I believe that you insist that ordinary sanitation is sufficient to prevent small-pox. With special regulations and strict isolation I believe you have been able to keep the town very free from it. I should be but a bad sanitarian if I did not recognise the value of both these measures, but I would point out that you are working now with a population that is for the most part already vaccinated. What it may be when an unvaccinated population has accumulated is a very different thing, and I fear you will have a rude awakening. It is an entire mistake to suppose that a prophylactic measure, such as vaccination, is antagonistic to general hygiene, on the contrary they go hand in hand. We are now too fully convinced of the advantages and paramount importance of general sanitation to be likely to fall so far back into error as to neglect it. The results obtained in the past are but an earnest of what may be done in the future, but our labours must be unremitting, and we must take as our motto—

"Count nothing done while ought remains to do."
Nil actum reputans dum quid superesset agendum.

SECTION I.

SANITARY SCIENCE & PREVENTIVE MEDICINE.

ADDRESS

By Arthur Ransome, M.D., F.R.S.

PRESIDENT OF THE SECTION.

It is desirable that in its brief periodical visits to the principal cities and towns of the country, our Institute should, if possible, leave behind it some abiding and growing influence.

When I was first asked to undertake my present duties, it was my wish to conduce to this end by advocating the establishment in each town visited by the Institute, of some local sanitary association, similar to the one with which I am connected in Manchester, that has now been at work in that city for more than thirty years. If this suggestion were adopted there would then be scattered over the country permanent, and, we may hope, active associations, each of which would carry on the objects of our Institute, and that would prevent our visits from becoming merely a "three days' wonder," and their influence from quickly dying out.

There are probably few places in England that would be so likely as Leicester to benefit from the establishment of such an institution in its midst. From the Registrar-General's last annual return it appears that the mortality in Leicester of infants under five years of age was over 500 per 1000 deaths—more than one-half of the total mortality—and during the month of July the *Sanitary Record** notes no fewer than 100 deaths from diarrhœa, an eminently preventible disease.

Such a fearful mortality as this must be due to something wrong in the place itself. As Mr. Simon remarks:† "Local

* Aug., 1885, p. 72.
† Papers relating to the sanitary state of the people of England, 1858, p. 8.

excesses of fatality are due to local circumstances of aggravation," and "these aggravating local circumstances are such as it is fully possible to counteract."

Surely it behoves the inhabitants of this great town to take measures to remove such a reproach to their humanity as soon as possible. One of the best means for this purpose would be, I believe, the formation of an influential voluntary sanitary association.

I should have wished to dwell longer upon this subject, but I have been requested by your chairman, Dr. Alfred Carpenter, to treat more generally upon the subject of disease prevention, and must therefore leave this suggestion for your future consideration.

I am, however, unwilling to abandon the hope of leaving behind me some statement that may have a permanent influence upon the sanitary enterprise of this place, and as a merchant endeavours to sell his wares by offering samples and proofs of their value and efficiency, so I propose now to advocate sanitary measures by giving you a record of a few facts showing the success that has attended their application in the past.

The present time is particularly opportune for a review of this kind.

We are now probably approaching the end of an epoch in sanitary science, and as Dr. Whewell has shown* no important advance of any science ever takes place with perfectly equable steps. The epochs marked by each such advance have both a "Prelude" and a "Sequel."

At the present time, thanks to the labours of such men as Simon, Pasteur, Lister, and others, we have passed through the greater portion of the first part of the period. The careful researches of these observers have revealed to us such a knowledge of the causes of many epidemics and of some endemic diseases as will enable us to cope successfully with them in the future. But now comes the "sequel" of the epoch, and in this period, whilst we may expect the above discoveries to acquire a more perfect activity and a more complete development, a great part of our work will consist in diffusing our knowledge through a wider throng of the secondary cultivators of the science, and in tracing it into its distant consequences. This, as Dr. Whewell remarks, "is a work always of time and labour, often of difficulty and conflict."

The work of diffusing amongst the community the knowledge that has been gained is especially necessary in the case of sanitary science.

* History of the Inductive Sciences, vol. I., p. 10.

The successful application of its principles depends to a great extent upon their willing acceptance by the people. In these times, no law, however good, can work with thorough efficiency in the face of even a small phalanx of mistaken malcontents. We have not to look far for an illustration of this fact, there are abundant indications in this locality of the "difficulty and conflict" characteristic of the period; but it is the special function of the Sanitary Institute to enter into battle with the opposing forces, and one way in which this may be done, and the one most likely to leave permanent results is to build up in the minds of the people a rampart of well-ascertained facts, that will enable them effectually to resist the battery of specious arguments that will be brought against them.

To take another analogy, and one more in harmony with our peaceful office, let us endeavour in this resting period, so to feed men's minds with facts and with the principles drawn from them, that they will be ready hereafter to put in force all the beneficent and health-giving procedures that have been provided for them by the earnest labours of so many generations of single-minded men of science.

I can do little more now than indicate one step that may be taken in this direction by the Agents of our Institute—namely, to insist constantly upon the successful results obtained by sanitary measures in the past.

It is a trite saying that men often fail to realize the blessings of health until they have lost them, but the converse of this proposition is equally true of the popular appreciation of the value of preventive medicine, for in an improved condition of public health, people easily forget the evil times through which their forefathers have passed, and hence they seldom fully realize their own present happiness.

Up to a comparatively recent period it was scarcely possible to appeal to the general rates of mortality of the country for evidence of an improvement in its sanitary condition, as Mrs. Browning says:—

> "The world we're come to late, is swollen hard
> With perished generations and their sins:
> The civiliser's spade grinds horribly
> On dead men's bones, and cannot turn up soil
> That's otherwise than fœtid."—*Aurora Leigh*, p. 52.

Thus the death-rate was apparently unchanged from decade to decade, and it was necessary to enter into details to show that some such improvement must have taken place to countervail the many other sources of mischief that had been steadily

increasing along with the increasing concentration of the population.*

These details are by no means less significant at the present time, but within the last ten years a striking change has taken place even in the general death-rates, and whose runs may read the vindication of sanitary science. A saving of life to the extent of about three-quarters of a million of persons in a decade may now be reckoned up from the pages of the Registrar-General's returns, and, when we examine the figures that he gives, the diminution in certain classes of disease points unmistakably to the influence of measures of preventive medicine.

The following table is taken from the last annual return, and gives a comparison between the ten years 1861-70, and the three years 1881-83, and it shows that the total saving of life from the specified diseases amounts to over 60,000 annually.

The most notable improvement in these figures is in the four diseases: scarlet fever, fevers (mainly typhoid), diarrhœa and phthisis. All these complaints, with the exception of the first, have been found to be distinctly controlled by better drainage and water supply, and it is highly probable, as has been shown by Dr. Alfred Carpenter, that scarlet fever must also be classed amongst these diseases.

DEATH-RATES IN ENGLAND (PER MILLION).

	1861-70.	1881-83.	Differences.	Total Annual Saving.
Small-pox	162	68	— 94	2,444
Measles	442	369	— 73	1,898
Scarlet Fever	972	513	—459	11,934
Fevers	885	292	—593	15,418
Diphtheria	187	140	— 47	1,222
Cholera	108	13	— 95	2,470
Diarrhœa, &c.	868	601	—267	6,942
Phthisis	2488	1846	—642	16,692
Other Tuberculous Diseases	768	713	— 55	1,170
				60,190

But the case in favour of sanitation becomes still stronger if we take account of its application in special instances.

1. In the Army and Navy.—At one time—namely before the year 1854—no class of our population was apparently so unhealthy as our soldiers and sailors, when its mortality was compared with that of the ordinary civil population of the country. This fact also was the more remarkable because these men had been selected from amongst these very people for their health and strength, and had all been submitted to a careful medical examination before they were enrolled. In certain army corps also they were drawn for the most part from a class above the lowest ranks of society. Her Majesty's Guards are nearly all of them not only men of the most stalwart proportions, but many of them are of birth and condition above that of the ordinary rank and file of the army, and yet at one time, as you may see from the following Table, these men died at three or four times the rate of the ordinary civil population, many of them succumbing to consumption and others to various forms of fever.

* See address on the present position of State Medicine in England: *British Medical Journal*, 1877, p. 214.

MORTALITY PER 1,000 OF STRENGTH.

	1830-37.	1837-47.	1863-72.	1874.
Household Cavalry	14·5	11·1		
Cavalry of Line	15·3	13·5	9.17	8·79
Foot Guards	21·6	20·4		
Mediterranean Stations	21	16·4	11.2	7·27
Canada, &c.	23	17	9·49	6·0
Jamaica, &c.	91	59	17·05	16·9
Madras, India	52			
Bengal, „	44	—	24·22	14·22
Ceylon	49	—	21·95	6·04

Rates of Mortality at the same ages prevailing in healthy country populations	7·7
In England and Wales	9·2
In Manchester	12·4

The report of the Commissioners shows clearly that the chief causes of this fearful mortality were to be found in the unwholesome barracks in which these men had to live: "The dormitories or barrack rooms are very confined, the minimum cubic space allowed to each soldier by regulation being only 450 feet, and in a majority of cases even this minimum is not attained; in a number of barracks there is a deficiency of one-third, and in some instances of more than half of the space allotted by regulation." (P. 17.) "The result is that the soldier sleeps in a fœtid and unwholesome atmosphere."

One witness (Sergeant Brown) on being asked as to the state of the air of these rooms replied: "A very thick and nasty state, especially if I came in out of the air. If I went in out of my own room sometimes, I could not bear it till I had ordered

the windows to be opened to make a draught." The conclusion of the commissioners, drawn from all the facts brought before them, was that "the ravages committed in the ranks of the army by pulmonary disease are to be traced, in a great degree, to the vitiated atmosphere generated by overcrowding and deficient ventilation, and the absence of proper sewerage in barracks." (P. 16.)

Shortly after this report was issued measures were taken to remove these defects, and the result is plainly seen in the improvement that has since taken place in the health of the army (see Table)—an improvement so great that, in the Abyssinian campaign, Lord Napier of Magdala was able to conduct it to its close without the loss of a single man from disease; and in the last annual report of the Army Medical Department for 1883, we find that the deaths of soldiers in the United Kingdom were only 6·28 per 1,000, and throughout the world only 9·57 per 1,000.

The improvement in the sanitary condition of the navy is little, if at all, less manifest. We are told by Dr. Guy ("Public Health," p. 162) that "in the year 1779, 70,000 men were voted for the service of the navy; of these 28,592 were sent sick to hospital, and 1658 died. In 1813, out of just twice the number (140,000) 13,071 were sent to hospital, and 977 died. In 1779, therefore, the sick were more than 2 in every 5, and the deaths 1 in every 42; while in 1813, the sick were about 2 in 21, and the deaths 1 in 143, the sickness reduced to a fourth, the deaths to little more than a third! These figures speak for themselves; they are very eloquent."

"Is it possible," he says, "to imagine a more conclusive demonstration than these facts afford of the reality and importance of the science and art of hygiene?"

If it be true, as it undoubtedly is, that by improvements in diet, water supply, and ventilation, in clothing and cleanliness, aided by superior medical treatment, and especially by vaccination, and by an improved dicipline, tempered by mental culture and amusement; if it be true that these improvements and reforms have saved life, and prevented sickness to such an extent that the effective force of our navy has been more than doubled, that one ship, for every purpose of navigation and warfare, is at least equal to two of the same size and force, that a vessel can now keep the sea twice or thrice the time that was possible less than a century ago; if it be true that, at the old rate of mortality, all Europe could not have furnished the seamen necessary for our defence and safety during the great revolutionary war; then is it a mere waste of words to argue that health, which is the strength of all who work, is the great source of power to nations in their peaceful labours as in their warlike struggles?"

I may bring this eloquent account up to date by saying, that in the last report of the health of the navy (for 1883) the death-rate was only 5·88 per 1000 in all, and only 4·05 from disease alone, the lowest record since the commencement of these reports, 28 years ago.

2. Prisons. Let us next inquire as to the past and present of the prisons of the country, and as to the past let Lord Macaulay speak. "In the times of the Stuarts," he says, "the prisons were hells on earth, seminaries of every crime, and of every disease. At the assizes the lean and yellow culprits brought with them from their cells to the dock an atmosphere of stench and pestilence which sometimes avenged them signally on bench, bar, and jury. But on all this misery society looked with profound indifference."

Dr. Guy, in his admirable little work on "Public Health," gives many interesting details respecting the "jail distemper," the Black Assizes at Oxford in 1577, and at Launceston in 1742, when so many persons died, including the Lord Chief Barons, sheriffs, and others, that Macaulay's account is fully justified.

He also describes the state of the prisons, and the fearful condition of their inmates drawn from Howard's statements. It must suffice to say that, "from a public inquiry, it appears that from August 1776 to March 1778, out of 632 prisoners 176 had died," much more than 1 in 4.

Contrast with this state of things the condition of prisoners at the present time. Our prisons are now models of hygienic management, and in the last report of the Medical Inspector it is stated that "the conditions under which the prisoners are placed are such as to maintain their health, and in most cases to improve it."

As Mr. Escott points out*—"The prisoner's health is carefully tended. He is continually weighed, if he falls away in flesh, or suffers from bodily ailment, he is prescribed for or admitted into hospital. His moral welfare is equally regarded."

The Secretary of State for the Home Department writes in November, 1883:—"The progressive decrease in the death-rate of the prisons, which has now reached 7·8 per 1,000 of the prison population, is a striking proof of the successful care that has been bestowed on the health of the prisoners." "Considering that the class of persons who are placed under the care of the medical officers are generally those whom vice and crime have rendered

* England, its people, polity, and pursuits, p. 251.

unhealthy subjects, this death-rate (even taking into account the number of diseased prisoners released on the score of ill-health), must be regarded as singularly low."

It will be noted that it differs very little from the rate already given of the general civil population of the country between the ages of 21 and 50, and it may be remarked that of the 17,000 prisoners 3,500 are under 21, and 1,700 are over 50.

It may possibly be objected that it is scarcely fair thus to compare the England of the time of Howard the Philanthropist with that of to-day.

The neglect of the prisoners in those times was of a piece with the general neglect of sanitary matters, and was the cause of the fearful mortality. Its diminution then might be supposed to have had little to do with sanitary science properly so called; that the common sense of mankind had amended the evil before the birth of this branch of knowledge, which has only arisen in the course of the present century and most of it within the limits of the reign of our present gracious sovereign. This was not the case, however, for the improvement of prisons took its rise after the passing by the House of Commons in 1774, of an Act for Preventing the Jail Distemper.

"This Sanitary Act," says Dr. Guy, "had many of the properties of sound legislation. It is concise and clear, prescribes what is to be done, insures the requisite publicity, constitutes a body of inspectors (the Justices of the Peace in Quarter Sessions assembled), and provides a summary punishment for the infringement of its own provisions."

3. *Small-pox and Vaccination.*—There is yet another instance of the beneficial operation of a sanitary measure, as to which it is also necessary, happily for us, to travel back into the past, at least as far as the beginning of the present century, before we can fully realise the good that has been derived from it.

I speak now of vaccination, and I am the more impelled to go into some detail upon the subject because I am informed that in this town there are still to be found many persons who doubt the value of the protection it affords, and who stoutly oppose the existing laws on the subject.

It is difficult now-a-days to realize the terrible nature of small-pox. To the civilized and protected classes of society it has almost ceased to be a fatal disease. In the Table which I have given you, it will be seen that only sixty-eight persons per million died of it, and even in the great epidemic of 1871 and 1872, less than 1 in 1,000 many of them unvaccinated persons. But in the times before vaccination, as Mr. Simon tells us, "it often ravaged more fiercely than the most ruthless of human wars." "In every country, probably, its first

invasion has been of this kind, and its recurrences, when far apart, have been of equal malignity. Thus it was that in 1518, following European adventure to the western world, it concurred with fire and sword, and famine and blood-hounds, to complete the depopulation of St. Domingo; thus, that soon afterwards, in Mexico, it even surpassed the cruelties of conquest, suddenly smiting down three and a half millions of population, and leaving none to bury them; thus, that in Brazil, in the year 1563, it extirpated whole races of men; thus, that about the same period, in the single province of Quito (according to De la Condamine), it destroyed upwards of 100,000 Indians; and thus, too it has been in later days that Siberia and Kamschatka have been ravaged; thus, that again and again, till very recent times, the same dreadful pestilence has depopulated Greenland and Iceland. Before the terror of its presence, communities literally dissolved themselves, and the well-known description of the plague at Athens does not convey more dreadful images of human suffering than may be gathered from the writings of those travellers who, even to the latest times, have witnessed the power of natural small-pox against remote, unprotected populations. While such was the small-pox in the less travelled parts of the world, it seems certain that in civilized Europe, with its constant intercourse of towns and countries, the disease was at least as deadly. Its strength, indeed, was differently distributed, not—as in Greenland—twice or thrice in a century, but incessantly, that fatal sickle was in motion, and the harvest counted from day to day. Instead of coming after long absence on masses of population entirely unprotected against the infection, it recurred in each place so frequently that, for the most part, at any given moment, a more or less considerable majority of the inhabitants would have faced the danger before. They would have obtained against its attacks that protective exemption which was generally the good fortune of survivors. But it is a moderate computation, that for every five persons thus, at the price of much past suffering, almost secured against the disease, one at least must have died. The annual ravages of small-pox in Europe alone have been estimated at half a million of lives. M. De la Condamine reckoned that in France a tenth of the deaths were by small-pox; Rosen's estimate of Sweden was to the same effect. For our English experience there exist only imperfect records, but it seems that within the London bills of mortality, small-pox, when not at its worst, averaged a fourteenth of the annual total of deaths; a fourteenth, too, at times when that total, as compared with the population, represented perhaps double our present death-rate."

"Yet the ravages of small-pox are not half enumerated in the list of the myriads whom it killed." From the earliest to the latest medical records of the disease, there is constant mention of the tax which it levied upon the survivors. "Among those who outlive it" (says De la Condamine) "many either totally or partly lose their sight or hearing; many are left consumptive, weakly, sick, or maimed; many are disfigured for life by horrid scars, and become shocking objects to those who approach them." "It is scarcely needful to say of the disease I have described that it was amongst all civilised nations a constant source of terror," and "perhaps at no previous moment of English history had the horror of small-pox been greater or more fully justified than at the beginning of the last century." Let the same writer (Mr. Simon) tell us of the change produced by the practice of vaccination: "The results are truly conclusive."

Compare for instance, in the case of Sweden, the twenty-eight years before vaccination with forty years soon afterwards;—during the earlier period there used to die of small-pox, out of each million of the Swedish population, 2,050 victims annually; during the latter period, out of each million of population, the small-pox deaths have annually averaged 158."

"Or, compare two periods in Westphalia: during the years 1776-80, the small-pox death-rate was 2,643: during the thirty-five years 1816-50, it was only 114. Or taking together the three lines which belong to Bohemia, Moravia, and Austrian Silesia, you find that where formerly (1777-1806) there died 4,000, there now die 200."

"Or, taking two metropolitan cities, you find that in Copenhagen, for the half century 1751-1800, the small-pox death-rate was 3,128, but for the next half century only 286; and still better in Berlin, where, for twenty-four years preceding the general use of vaccination, the small-pox death-rate had been 3,422, for forty years subsequently it has been only 176."

"In other words, the fatality of small-pox in Copenhagen is but an eleventh of what it was; in Sweden little over a thirteenth; in Berlin and in large parts of Austria, but a twentieth; in Westphalia but a twenty-fifth. In the last named instance, there now die of small-pox but four persons, where formerly there died a hundred."

But we have not yet reached the full extent of the benefit to be derived from vaccination.

After a multitude of operations had been practised it became evident that complete immunity to subsequent attacks of small-pox had not been conferred; either from an insufficient original inoculation with the lymph, or else from a gradual fading away

of its influence, some of the vaccinated persons were found to take the disease, though usually in a modified form.

Since it was in adults, or in persons who had not been vaccinated for a number of years, that this liability to contract small-pox was mostly perceived, it was most probable that the latter explanation was the most usual one, and accordingly the practice of re-vaccinating adults was introduced. In most of the European armies all the recruits were obliged to undergo this operation, with the result that in all of them the mortality from small-pox was still further reduced.

In Germany, after the Franco-German War, when the small-pox epidemic of 1870–71 prevailed, the idea began to be entertained that still better results would have been obtained if the army had not been exposed to the increased intensity of the poison due to a surrounding population only imperfectly protected against its attack.

In this country therefore a still more stringent Vaccination Act was passed in the year 1874, making not only infantile vaccination but re-vaccination compulsory.

According to this law, "every pupil at public or private school must be vaccinated in the twelfth year of life, unless he has had ordinary small-pox within the last five years, according to medical witness, or has been successfully re-vaccinated."

The result of this enforced re-vaccination has been almost to stamp out small-pox altogether. The records of the small-pox mortality in London, Paris and Berlin respectively show that the remarkable and persistent decline of the disease since 1874, can only be due to the new vaccination law—for all other conditions in these towns remain since that date pretty nearly the same as they were before. The mortality from this cause in the general population is now reduced to 2 or 3 per 100,000 persons, and in the German Army not a single death from small-pox has taken place since the year 1874.

In the Austrian and French armies during the same period there is still a large death-rate from this cause.

The following comparison between these armies is given in the report of the German Vaccination Commission,* published at the commencement of the present year.

At the beginning of the year 1870, the armies of Prussia and Germany, as well as the united populations of these countries, had to go through an epidemic of small-pox. Accurate numerical data are lacking with regard to the French army, but it is certain that its losses also were very considerable. During

* The Report of the German Vaccination Commission is printed with the diagrams in the *British Medical Journal*, August 29th, 1885, p. 408.

the year of the war, the Prussian army had by far the fewest losses, although in France the soldiers came frequently into contact with the infected population.

The war in itself, with its hardships and deprivations, could not have increased the mortality from small-pox, for the Austrian army, in the same epidemic, suffered far greater losses from it.

The only difference with regard to the ratio of small-pox in the three armies is, that the French and Austrian army was incompletely re-vaccinated, and also inadequately vaccinated, and therefore found to be more visited by small-pox, while the Prussian army had the advantage of having re-vaccination carefully carried out, and enjoyed the protection which a neighbourhood almost free from small-pox procured for it. The prejudicial influence of a neighbourhood tainted with small-pox, and the relative protection of a neighbourhood free from it, is, however, evident from the Table of the cases in the Prussian army, given in the report referred to.

It must also be noted that re-vaccination had been already practised several times (every tenth year) in the army. Notwithstanding this, cases of small-pox were more numerous in the years 1867 to 1869, and therefore before the time of the inoculation law, than after the year 1874. For this fact there is no other explanation than that, in the same way as small-pox in the army considerably increased in consequence of the close contact with the sick in France, so, formerly, it must have been more frequent in the army, as the civil population had also more sickness from small-pox than at present. It is noteworthy that since the year 1874 no deaths from small-pox have occurred in the Prussian Army, while both the other armies still show by comparison quite a considerable mortality from this disease. No other reason can be given for such an exceedingly striking difference between the prevalence of small-pox in the three armies than the working of a strictly-carried out inoculation and re-vaccination.

I commend these facts to the attention of the anti-vaccinators of Leicester and other places, only expressing my fear that those who fail to be convinced by them are inaccessible to any argument whatever.

4. Consumption.—I have already called your attention to the remarkable reduction in the number of deaths from consumption. Hitherto this disease has not usually been classed amongst those that can be prevented by sanitary measures; it has been supposed to be mainly a matter of nutrition and of circumstances beyond the control of local authorities; but Dr. Buchanan has demonstrated the enormous ameliorating influence of drainage upon this disease. It appeared to me that it might be desirable

to ascertain what was the limit of its preventibility. I had noticed that the disease was comparatively infrequent in the place in which I myself live, and it occurred to me that I might ascertain how many cases originated in the different parts of the locality. A great portion of it is composed of deep porous soil, but it is surrounded by boulder-clay, the result of glacial drift, and a great part of Bowdon, and parts of Dunham and Altrincham, are built upon a thick bed of sand, in many places over 100 feet in thickness. The climate is thus rendered temperate and the air and soil dry. After the wettest weather the paths speedily become dry, and the basement story of a house is often as dry as its attic. It has the further advantage that it is virgin soil. The sand is as pure and free from organic matter as in the days when it was deposited by ice floes, or was silted up by the estuary of the Mersey. No house is ever built upon freshly made ground, or on pits that have been filled up with refuse. The locality is also well sewered and has a plentiful supply of good water. Moreover, the inhabitants are for the most part well-to-do people. Out of 2,559 of population at the last census, only about 500 are poor, and live on the low-lying clay lands that surround the sandy downs upon which Bowdon is built. The remainder dwell in well-built, salubrious houses, they are well fed and comfortable in their circumstances.

It will thus be seen that such a community are in a position peculiarly well fitted to preserve them from attacks of tubercular disease. I was, however, hardly prepared for the result of my inquiries.

I obtained from the superintendent registrar of deaths an extract from the death register of all the deaths from diseases of the lungs occurring in Bowdon in the ten years 1875-84.

Of these 22 were from phthisis, but 11 of them took place in the low-lying clay lands before mentioned, and 9 of the remainder were found to have contracted the disease before coming to Bowdon. This leaves two to be accounted for, and one of these was a gentleman connected with the city mission in Manchester, who was therefore constantly obliged to attend crowded evening meetings in different parts of the town. The other was a merchant's clerk, who went to town at 8 every morning, and did not return until 7 p.m. None of the female population, who are more constantly in the place, contracted the disease there.

Such a record as this is a strong testimony to the truth of the observations made by Drs. Bowditch and Buchanan, as to the influence of a well drained porous soil upon the disease, and it holds out to us the hope that when further attention is paid to this point, a large part of the terrible mortality that still

takes place from this disease may be prevented, and that consumption may cease to be as it has been called 'the scourge of the English people.'

I have now passed in review the success that has attended sanitary effort in diminishing the general mortality of the country, especially that from such diseases as scarlet and other fevers, from small-pox, and from consumption. I have also shown its influence in the special cases of the mortality in the army and navy, and in our prisons.

We are still far from having reached the full extent of the benefits that may be derived from it, but we may hope by its means to bring somewhat nearer the time promised by Isaiah to those who obey God's laws, when "There shall be no more thence an infant of days, nor an old man that hath not filled his days, for the child shall die an hundred years old."—*Isaiah*, c. lxv., v. 20.

On "Infantile Diarrhœa," by Dr. W. E. Buck.

This question of Infantile Diarrhœa appeals to us especially in Leicester, as this town has been for a long series of years notorious for the excessive mortality from this cause. In dealing with this subject, I propose firstly to point out the peculiarities of the death-rate from this source, as shown by the quarterly reports of the Registrar-General; secondly, to take the positive facts; thirdly, to deal with the negative facts; fourthly, to bring before you a theory that I have long held, together with such corroborative evidence as I have obtained; and lastly, to add a few words on the pathology of what I venture to call specific diarrhœa.

The first point to be noticed in the quarterly report is that the deaths from diarrhœa are taken and multiplied by four, so as to make an annual rate per 1,000 for the third or summer quarter; this is usually known as the diarrhœa rate. According to these tables during ten years, 1874-83, Leicester is at the head of the list with 7·1, being followed by Preston 6·4, and Hull 5·0; while at the end are Bristol 1·7, Huddersfield 1·6. and Halifax 0·9. These are all commercial and manufacturing towns, and yet they constantly occupy the same relative positions in the diarrhœal rate.

Average annual death-rate from diarrhœa in summer quarters of 10 years—1874-83:—

Leicester	7·1	Wolverhampton	3·0
Preston	6·4	Blackburn	2·9
Hull	5·0	Bradford	2·8
Salford	4·7	Portsmouth	2·7
Leeds	4·5	Brighton	2·6
Birmingham	4·2	Derby	2·5
Sheffield	4·0	London	2·4
Bolton	3·9	Cardiff	2·4
Liverpool	3·8	Plymouth	2·1
Manchester	3·5	Oldham	1·9
Sunderland	3·4	Birkenhead	1·8
Norwich	3·4	Bristol	1·7
Newcastle-on-Tyne	3·1	Huddersfield	1·6
Nottingham	3·0	Halifax	0·9

Mr. Vacher, in an able paper, says that the returns of the Registrar-General are not accurate. Well, no statistics, I suppose, are absolutely and infallibly accurate, and death returns are subject to disturbing influences. Many a death from delirium tremens or from hereditary syphilis is registered under some more respectable head; there are occasional misleading certificates given in order to secure insurance money; and even the best of men may make mistakes in diagnosis. But these influences are the same in all towns; and though the returns may not be strictly accurate, I think we may assume them to be relatively so, and may fairly use them for purposes of comparison. A still more important point made by Mr. Vacher, and one that may be fittingly discussed here, is whether this diarrhœa is one or many diseases, or whether it is merely the symptom of a disease.

Now, I freely grant that diarrhœa occurs as a symptom of many chronic and wasting diseases, but the deaths from these take place all the year round, and are not the cases which swell the rates at Leicester, Preston, and Hull. They probably occur nearly equally in every large town in the kingdom. If this diarrhœa were simply symptomatic, the death returns would at least show a remarkable prevalence of the diseases producing this symptom at the just-mentioned towns, while they would be almost absent from such a fortunate place as Halifax, with a diarrhœal rate of only 0·9.

No, this diarrhœa is more than a symptom, it is a disease in itself, of which an apparently healthy child may die in 1, 2, 3, 4, 5, 6 days, or under a week after seizure.

Out of a total of 216 deaths, 92 infants were ill for one week

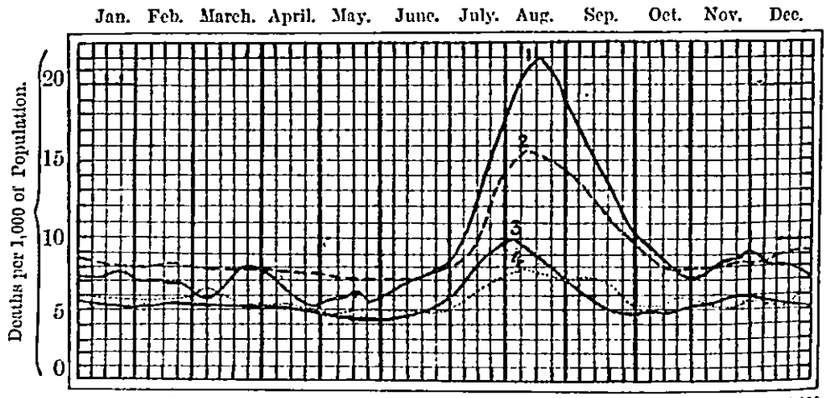
or under, 60 between 1 and 2 weeks, and 44 over 3 weeks. Thirty-three were ill only for 3 days and under, and I have known a previously healthy child to die in 12 hours. My father, when Medical Officer of Health for Leicester in 1851, writes in his report:—"Without denying the influence of weather and seasons, I am of opinion that this disorder is mainly produced by organic decomposition. Its victims will be found to be, exclusively, the very old and the very young—those who from inherent debility are more confined to the vicinity of their own dwellings—thus becoming, as it were, doubly liable to an endemic disorder; the manner of its seizure oftentimes being sudden, like a lightning stroke, and its speedy development (prolonged a few hours certainly beyond the Asiatic cholera) appears to me more nearly to indicate the presence of an organic poison than any other source that could be devised as its probable origin."

This view only confirms the opinion I have formed from my own observation, namely that there is a specific diarrhœa which is present in those towns which have a high diarrhœal rate, and absent from those places where the rate is so low that the few cases registered are probably due to diarrhœa produced by some other disease.

It is very difficult to get *post-mortems* on these cases, still I have made 10, and the pathology, although slight, is quite distinct; I have also found bacilli of the same character in both fœces and intestinal tissue, as I will endeavour to show you.

There is, however, one point on which I believe all observers are agreed, namely, that as the heat increases so the diarrhœal rate rises in those towns where there is a large mortality from this cause.

MR. BUCHAN'S CHART.

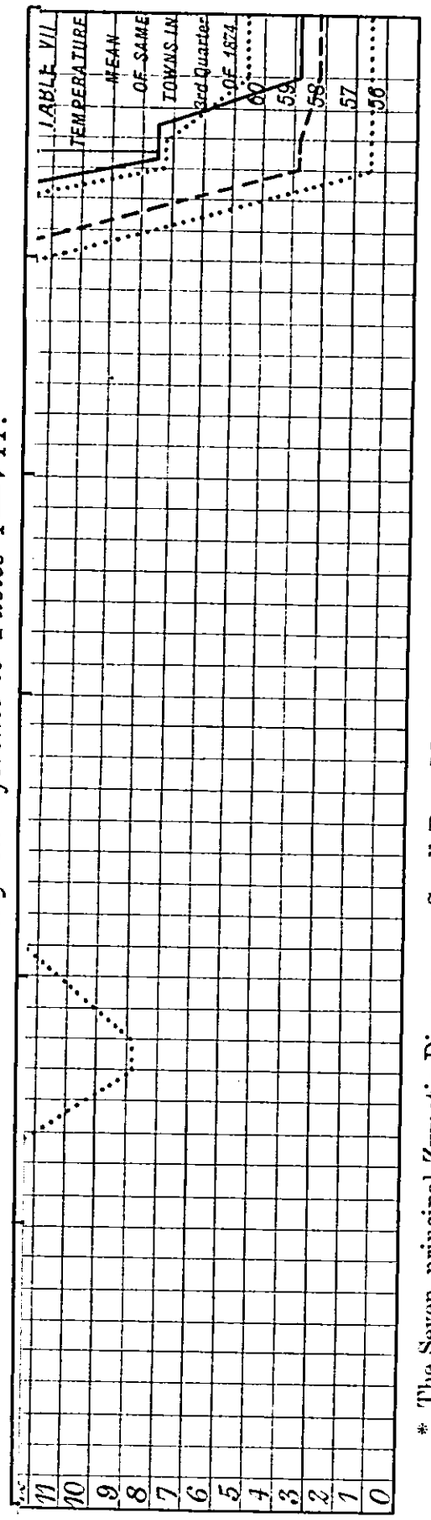


The Weekly Deaths among Infants under one year of age on the Annual Mortality per 1,000 of the whole population. For Leicester, Curve 1; Liverpool, 2; London, 3; and Bristol, 4.

MORTALITY CHART—LEICESTER COMPARED WITH OTHER TOWNS.

The numbers below are derived from the Registrar General's Annual Summary of the Births and Deaths of the Eighteen large Towns of England, for 1874. The decimals are of course only rendered approximately, thus 0·8 = 0·2 = —

The decimals can be seen accurately on reference to Tables I—VII.



* The Seven principal Zymotic Diseases are Small-Pox, Measles, Scarlet Fever, Diphtheria, Whooping Cough, Diarrhœa, and Fever { Typhus, Typhoid, Simple.

Eighteen large Towns of England:

LONDON.	BIRMINGHAM.	SALFORD.
PORTSMOUTH.	LEICESTER.	OLDHAM.
NORWICH.	NOTTINGHAM.	BRADFORD.
BRISTOL.	LIVERPOOL.	LEEDS.
WOLVERHAMPTON.	MANCHESTER.	SHEFFIELD.
		HULL.
		SUNDERLAND.
		NEWCASTLE-ON-TYNE.

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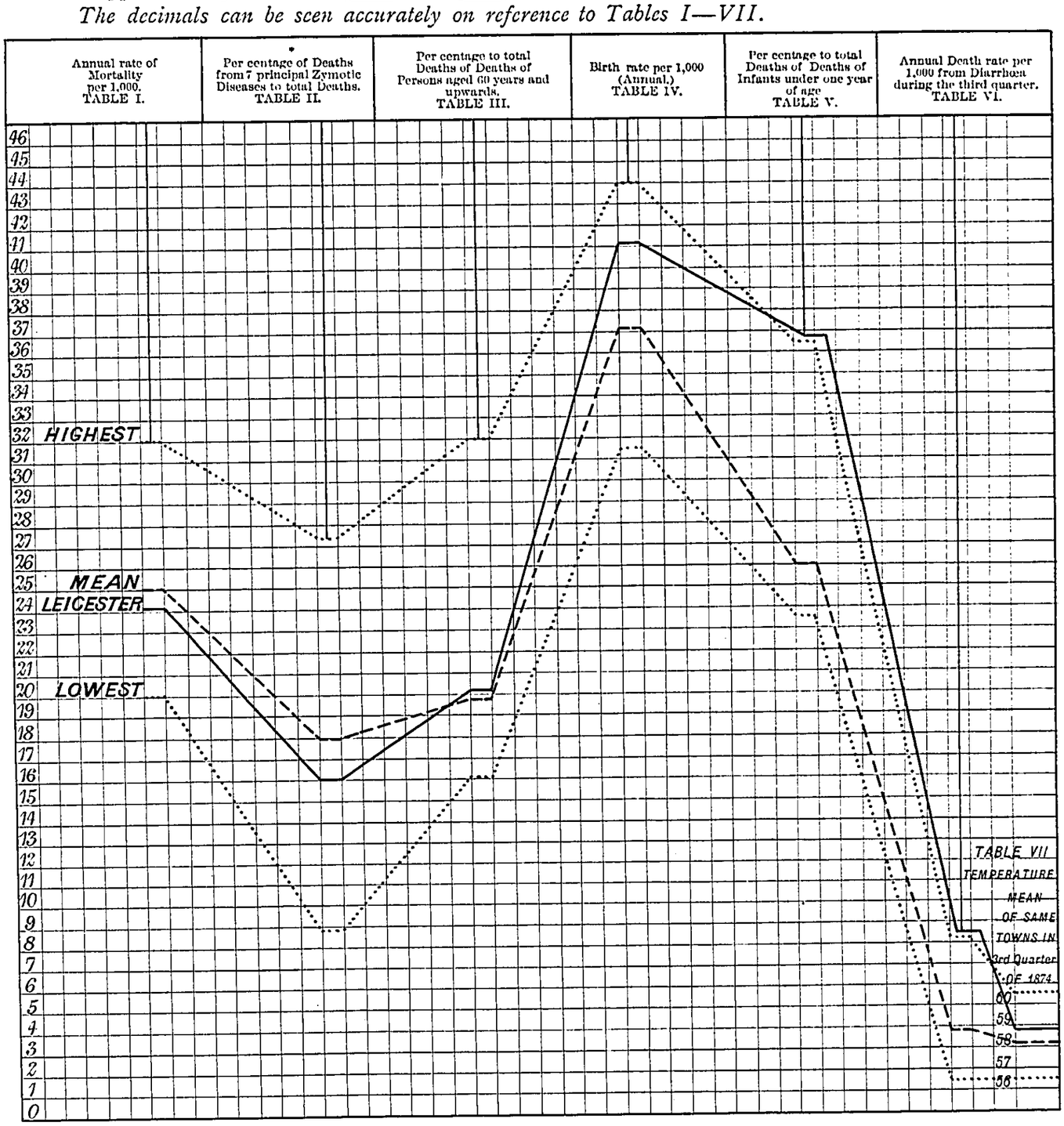

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BRISTOL.	LIVERPOOL.	LEEDS.	NEWCASTLE-ON-TYNE.
WOLVERHAMPTON.	MANCHESTER.		

This is conclusively proved by Mr. Buchan's chart, but he also makes this remark: "At Leicester the summer temperature does not exceed that of Bristol, but while the summer death rate from diarrhœa at Bristol is 2·38, at Leicester it is 9·56; in other words, it may be assumed that there are local peculiarities affecting the population of Leicester, the effect of which is to quadruple the death rate from diarrhœa in that town as compared with Bristol. It is to these local conditions we must look for an explanation of the great differences in the death rate of the different towns."

In London in 1874, the mean summer temperature was two degrees higher and the diarrhœal rate 6 per 100 *lower* than in Leicester. The returns show, as Dr. Buchanan has remarked, that the June heat is not so fatal as the heat of July and August; therefore the effects of heat are not constant. This fact demands further study. Rain-fall also exercises much influence in lowering the diarrhœal rates, especially in those towns where they are remarkably high.

The summer of 1879 was cold and wet, Leicester headed the list with 2·1, while Halifax was at the end with 0·5. The summer of 1880 was hot and dry, and the diarrhœal rates were raised to 13·6 at Preston, 11·5 at Leicester, and 1·4 at Halifax, which still remained the lowest. This is typical of the general results of these influences.

The negative facts concern the many suggestions which have been made as to the etiology of the disease, and though many of these may be considered exploded, they crop up again and again. The favourite source attributed to the complaint is maternal neglect. Out of 216 cases examined by Mr. G. C. Franklin and myself in Leicester in 1875, 24·5 per cent. only of the mothers went out to work. Female labour is much employed in Halifax, Huddersfield and Rochdale, yet the diarrhœal rate in these towns is very low, whereas it is remarkably high at Hull, where there are not so many trades for women to work at.

The bottle also is supposed to be a fruitful source of diarrhœa; yet bottle-feeding prevails in towns all over England whether the diarrhœal rate be high or low; and children fed on mothers' milk are not exempt from the disease.

Another favourite theory is that diarrhœa is caused by filthy sewers; but it existed in Leicester before sewers were made, and does not seem to be materially increased by filth as many of the cases occur in clean houses both in Leicester and in other towns.

In Leicester and in other towns where this disease prevails, there is an ample supply of good water, but the diarrhœal rates have not been influenced thereby.

It has been suggested that infantile diarrhœa is a modified enteric fever. This theory is amply disproved. In all the *post-mortems* I have made, I have not found the slightest resemblance to the pathological conditions of typhoid fever. The period of the year during which infantile diarrhœa is most prevalent does not correspond with the season in which there is most typhoid. I cannot do better than quote the able remarks of Dr. Buchanan on this subject. He says:—

"Arranging, first, the several divisions of England in the order in which 'fever' (the great bulk of which was enteric fever) was fatal in them during 10 years; and putting on the same sheet the mortality of each division from diarrhœa, no visible relation appears between the mortality of the several divisions by the one and the other disease. Again, taking out from statistical returns districts with high or low fever rates, and examining the same districts as to their diarrhœal rates, little or no parallelism in the incidence of the two diseases can be found. Or, making a list of the 25 registration districts of England, that in 1851-60 had most fever, and another list of the 25 that in the same period suffered most from diarrhœa, only one name appears on both lists. The fever districts are seen to be essentially rural or small town districts, the diarrhœa districts to be large towns, most of them manufacturing towns."

Having taken up your time with dealing with theories which, as you have seen, are extremely easy of disproval, I now come to my own idea of this disease. I believe that there are certainly three factors in the production of this specific diarrhœa:—1stly, heat; 2ndly, moisture in the soil; 3rdly, an organism. If you will look at the maps of Leicester on which the deaths from diarrhœa are marked, you will see that these are mainly in the low-lying districts, and not in the higher parts of the town.

Let us also take the towns with the highest diarrhœal rate, namely, Leicester, Preston, and Hull; and compare their situation, drainage, and subsoil with that of Halifax, Bristol, and Huddersfield.

Leicester is virtually in a hole with a canalized river dammed up against it by mills and locks. There is on the north-east of the town a brook, which is held up by the river, and which is known to affect wells to a considerable distance.

Dr. Mason, in his sketch of "The Sanitary History of Hull," says:—"The whole of the soil of the flat around Hull is alluvial clay, or warp of more recent deposits. This deposit

varies from 4ft. to 10ft. in thickness, imposed upon layers of silt, sand, or gravel, the whole of which is incumbent on the chalk formation, which varies from 40ft. to 110ft. from the surface, and rises in high lands and hills to the north and north-west. The area of the borough itself, if we except the variations caused by artificial works, is perfectly flat; from this cause, and the lowness of the ground level, natural drainage would be impossible, were it not for the ebb and flow of the tide in the river Hull and Humber, by which a fall of 10ft. to 15ft. is obtained for several hours daily."

Preston is situated upon a clay soil, which has in it running springs of sand which have an abundant supply of water. The lower part of the town is on a black loamy soil, and underneath is a marshy and peaty sub-soil, and the sub-soil water is from 10 to 15 feet from the surface; that is about the same as Leicester. The river flows at the foot of the slope on which Preston is built, and a canal at a higher elevation than the river runs into the town. There are large cooling ponds attached to the mills; these occupy a considerable area, often as great as the mills themselves.

We will now consider the towns possessing the lowest diarrhœal rate, and for that purpose will take Bristol and Huddersfield.

The medical officer of health of Bristol informs me that the soil of that town is naturally dry, and that the deep and superficial drainage are both good, so that the soil dries quickly after rain. It is built on the new red sandstone, which rises above the alluvial deposit.

Huddersfield is excellently situated on the slope of a hill above the river Calne. Much female labour is employed there. There is a good system of drainage.

Bath and Rochdale both enjoy a comparative immunity from infantile diarrhœa; both towns are well drained and well situated, Bath standing on the slopes and heights of a range composed of Western Oolite, which rises like an amphitheatre from the valley.

I could quote many other towns to support my theory, but I think these illustrations are sufficient, and will now give you a list of towns, drawn up by Dr. Buchanan, giving the results of drainage on sub-soil water and the consequent effects on the diarrhœal rate.

I have left out two towns, as the Diarrhœal Returns were vitiated so as to spoil them for purposes of comparison. One town, Alnwick, certainly does not help me.

Analysis of Dr. Buchanan's Report, 1866.

	Diarrhœal Rates per 10,000. Before Works.	After Works.	Changes in Subsoil Water.
Cardiff.....	17¼	4½	Much drying.
Salisbury ...	6½	2⅔	" "
Stratford ...	11¼	5¾	Local lowering of subsoil water. I cannot put this in Dr. Buchanan's words, but the subsoil was evidently much dried.
Merthyr	11½	6½	The sewers lie deep and have no doubt operated to dry the gravel. Some recent drying.
Banbury.....	11⅓	5⅓	Drying of subsoil.
Newport.....	11	6½	Local drying of subsoil.
Alnwick	7	4⅔	No drying of subsoil.
Dover	9½	7	Local drying.
Cheltenham..	8⅓	7	Some drying.
Brynmaur ...	5	4⅔	Inconsiderable drying of subsoil.
Macclesfield..	11⅓	11	Local drying of subsoil.
Ely	4	4¼	Drying of subsoil.
Carlisle	11⅓	11½	Drying of subsoil, except in large poor area.
Chelmsford...	7	8	No notable change of subsoil water.
Worthing ...	4⅔	5½	Much drying of subsoil water. In wet weather the basements and cellars are flooded.
Leicester ...	16	19½	The subsoil water was much reduced in making the works, but it is doubtful if it is so much reduced now, as the subsoil receives the water of a large valley, which yields more water than the drains would be expected to carry off.
Penrith	4	5	No drying of subsoil.
Bristol	6⅔	9½	It is known that the wells (generally speaking) are unaffected by the sewage.
Warwick ...	5⅔	8	Some drying. The lower parts of the town are gravel, which would probably be water-logged by the dams which hold up the Nicholas Brook and the Avon. (The dams still exist, I believe.—W. E. B.)
Morpeth.....	8½	14⅓	No change.
Penzance ...	5½	9½	No change in subsoil water.

Professor Virchow, in a pamphlet on this subject, says: "The death rate rises in Berlin in July, August, and September, and this is due to excessive infantile mortality, mainly from diarrhœa." Virchow found the rise of this disease to be coincident with the fall of the ground-water of the Spree. "It cannot be doubted," he says, "that the fall in water levels (*i.e.*, sub-soil water) is conditioned by the increased evaporation produced by the increasing temperature."

Mr. W. H. Power has, under the direction of the Local Government Board, made a careful report on the occasion of his investigation of the outbreak of diarrhœa in Winchester in 1876. After disposing of the questions of which I have treated (*i.e.*, feeding of infants, &c.), he goes on to state that he found a special area in which the disease was most fatal. This special area he describes as including almost the whole of the low-lying inhabited parts of the older city, which is nowhere, except at its eastern and western limits, many feet above, and in places it is below, the river level. The sub-soil is of an alluvial and damp nature. Two rivers traverse this special area, and the natural drainage is impeded by mills and hatches.

The American physicians not only believe in the theory of the fatality of diarrhœa in the low-lying badly drained districts of large towns, but act upon it by sending children under three years of age into healthy country districts for the summer. There is an institution or hospital near New York built for this very purpose.

I have prepared a diagram illustrating observations that have been made of the height of the water in disused wells near the river Soar in this town. The rainfall is given, as well as the fluctuations of the sub-soil water.

These observations have only been made during three years, so it is yet too early to draw conclusions from them; but I would specially ask you to remark the decided decline of the water in the great majority of the wells in July and August, even after a heavy rainfall.

I will, in conclusion, dwell very briefly on the pathology of specific diarrhœa, as this part of the question is perhaps more strictly medical than sanitary. The changes after death are rapid. The ileum is more or less vascular in parts, generally in the middle. The intestine has lost its usual transparency and looks swollen and sodden. The mesenteric glands are enlarged and vascular.

On microscopical examination, after staining by Gram's method, I have found in most of the cases slender bacilli and always micrococci.

I have found similar bacilli in the fœces, together with micrococci and bacterium termo.

Dr. Klein is now experimenting with the cultivation of these bacilli, but the result is not yet published. I just mention this fact, I cannot go into it more deeply; it is a wide subject, and one perhaps more suitable to a pathological society.

Dr. A. Ransome (Manchester) heartily thanked Dr. Buck for his extremely valuable paper, and expressed his regret that many more investigations of a similar kind were not made. Before they could rightly determine the pathology of summer diarrhœa it was essential to have further careful investigation of this kind accompanied by more detailed post mortem examinations. As to Dr. Buck's theory he was only able to speak of Manchester and Salford; certainly experience confirmed what he had said with regard to the influence of a damp and low-lying area. In respect of this particular disease Salford followed very closely after Leicester, and a large part of the town was often below the level of the river, and consequently very subject to floods. No doubt Dr. Buck was right in his estimate of the influence of bad drainage on the disease, but he should like to know what was that gentleman's opinion with regard to the theory put forward some years ago by a former medical officer of Leicester as to the possible origin of summer diarrhœa being emanations from a soil previously saturated with organic filth. The drainage of Leicester was now no doubt very good, but it was only reasonable to suppose that there might have been a previous contamination from the soil pits that formerly existed, and which were highly calculated to foster the growth of organisms such as those to which Dr. Buck had referred.

Dr. Shaw (Leicester) wished to know whether Dr. Buck's inquiries had extended to the lower lying districts of Leicester, such as Home Street, and if so with what result.

Dr. W. Marcet, F.R.S. (London), pointed out that the same conditions which, according to Dr. Buchanan, promoted a low rate of mortality from consumption also promoted a low rate of mortality from diarrhœa. It would seem, therefore, that there was some connection between the two diseases. What was the effect of increased dampness or dryness of the atmosphere upon the human frame? Increased dampness of the atmosphere first of all checked perspiration. Checked perspiration involved a tendency to congestion of the internal organs, relief of which was found in increased secretions or diarrhœa. Checked perspiration also tended to congestion of the lungs, and might thus predispose to consumption. Diarrhœa was promoted by bad smells, heat, and quality of food. The effect of bad smells was very evident from the fact that many medical students were attacked with diarrhœa after spending some time in the dissecting room. It was well known, too, that in hot and damp countries, such as the Island of Madeira, the affection was very prevalent.

Dr. Swete (Worcester) asked Dr. Buck whether he could give any information as to the infantile death-rate amongst the Irish population. At Cardiff, Grayetown, occupied principally by Irishmen, was entirely free from the disease, and at Liverpool there was freedom during the first year of life amongst the Irish population, although after that

age the death-rate was similar to that of the English population. The Irish mother deemed it a religious duty to suckle her children, whilst English children were largely fed by the bottle; here then the milk seemed to be the cause of the mortality. At Worcester infantile diarrhœa was not so prevalent amongst the very poor as amongst the respectable workmen living in £10 houses which were built over old rubbish heaps; here subsoil emanations seemed to him to be the only cause, the infant being placed close to the fire in the cradle, the heat of the fire causing emanation to rise from the subsoil through the tiled flooring. He urged that local authorities should have power to clear building sites of noxious materials.

Surg.-Major Pringle (London) said when the condition of many house foundations around London, particularly in low-lying localities, was considered, the wonder was that there was not more sickness, and particularly infantile diarrhœa. The question of subsoil water, too, was of great importance in relation to this disease, from the infants and children being so near the floor level.

Mr. G. J. Symons, F.R.S. (London), was very much surprised that Bristol was said to possess a dry subsoil, inasmuch as not long ago he was consulted professionally on the subject of the flooding of certain districts of that city.

Mr. Alderman Barfoot (Leicester) pointed out, on behalf of the Corporation, that although a system of drainage had been substituted for the cesspits which existed throughout Leicester twenty-five years ago, and although they had now a pure water supply, the diarrhœal rate remained about the same.

Sir Charles Cameron (Dublin) remarked that the City of Dublin, from which he came, was generally described as healthy in consequence of its beautiful situation and environments. He had never held that opinion, for Dublin was built in the valley of a river—and not a very sweet one—the Liffey, into which the sewage of 360,000 people was discharged. The city was so low that the sewers had to be protected from the invasions of the sea by means of tidal gates; it was, in fact, waterlogged. Upon the theory just propounded it should therefore appear that the diarrhœal rate in Dublin was very high; on the contrary, there was very little death there from diarrhœa. Of course there did arise cases of diarrhœa in Dublin, as in other places, but these were very largely the results of eating unripe or over-ripe fruit.

Mr. Hancock, F.S.S. (London) asked whether many sanitary difficulties might not be overcome by originally building sewers of adequate dimensions, and whether these difficulties were not due to negligent delay, local authorities so frequently deferring too long

the duty of rebuilding the main sewers found to be inadequate for the purposes that had grown with the growth of the new districts taken over?

Ald. WINDLE (Chairman of the Leicester Sanitary Committee) remarked that the subject of the exceptionally high infantile death-rate had given the Sanitary Committee great anxiety, and for years they had been instituting inquiries and obtaining reports on the subject. Hitherto, however, they did not appear to have solved the difficulty with which the question was beset. They looked forward with interest to the meetings of this Congress and he was specially anxious to hear what the members of the Institute could tell them on the subject. He was bound to say that the discussion, so far as it had gone that morning, had disappointed him. Seeing the immense importance of the question to the people of Leicester he should be very glad if the President of the Institute (Professor de Chaumont) and other gentlemen of eminence present would give them the benefit of their views. Leicester was situated in a valley, they had a clay subsoil, and a most imperfect system of drainage, and their late Officer of Health, who had given an immense amount of attention to this subject, had come to the conclusion that the only exceptional thing in Leicester was the bad sewers, and that sewer gas emanations were the cause of the diarrhœa fatalities.

Dr. GRIMSON suggested the harmful consequences of the warmth of the sun on the subsoil when the water had partially drained off.

Dr. HOLLINGWORTH remarked that in Leicester a very considerable quantity of water drained through the material of the sewer itself. It was only reasonable to infer that much of the sewage drained out into the subsoil in a similar way, to the detriment of the public health.

Dr. ALFRED CARPENTER (Croydon) said there was one point in Dr. Buck's paper which seemed to have escaped attention, although to his mind it appeared to be the very basis upon which the whole subject of prevention must proceed, to have a satisfactory result, viz., the organism to which he referred as the principal factor in the causation of this particular disease. They all knew that organisms required certain conditions for the purposes of their development. In the case of the diarrhœal organism, what were those conditions? They appeared to be a certain temperature, in an impure subsoil with a certain freedom from too much water, diminished supply of oxygen, combined with a certain amount of damp. No doubt the sewers of Leicester had something to do with the impurity of its subsoil. If there prevailed at any given time a warm temperature, as that warmth extended deeper into the earth, the absence of subsoil water would allow the air in the subsoil to get much warmer than if it were waterlogged. The soil was, in fact, in a contrary state to a water-

logged condition, which allowed the rise of diarrhœa. He believed if Dr. Buck were to get the temperature of the earth just above the subsoil water, he would find just after a certain point of heat was reached, this organism began to grow; it then multiplied very rapidly in the interstices of the subsoil, and produced its two crops of spores, one already grown, the other resting. Then the question would be asked, How was it likely to affect children more than any other people? The answer was, That it did affect other people as well as children. In a subsoil that was free for a time from the rise of subsoil water, decomposition would set in and this organism would develop. The work of decomposition would express a certain amount of air which would find its way into the houses of the people, and carry with it, as it often did, the living, growing germs of disease. That organism could no more grow where the particular temperature was not reached, than yellow fever could be propagated at ordinary temperatures in this country. Yellow fever could never get a standing here, simply because the temperature was not high enough to continue and develop the germ upon which it depended. So it was with regard to this particular form of diarrhœa. The temperature of the subsoil must be raised to a certain height; it must be an impure subsoil, and it must be a subsoil loaded with decomposed organic matter, animal in its origin, such as would be found where pits were filled up with rubbish as the foundations for houses, and where sewers leaked. In such houses diarrhœa was pretty sure to be found, for there were the very conditions under which the germs could be produced. One point in natural history should be borne in mind. The death's head moth was only developed when temperature continued above the usual rate for a certain number of days. The germ capable of producing it lies dormant for years unless the temperature is reached, and so we have in hot seasons a breed of moths which are not seen in colder times. In its advent, it therefore corresponded with this summer diarrhœa of Leicester. He felt sure that if the authorities would institute some experiments as to the temperature of the subsoil and of the subsoil water, and as to the character of the air to be found in the subsoil, they would find some steady and continuous facts which would support the view he had given as to the cause of this particular summer diarrhœa. The way to remedy the evil would be for the Leicester authorities to put down sewers that should not be pervious, sewers that should not be mere elongated cesspools, and to endeavour to keep the subsoil upon which the houses were built free from impurities of every kind. It was of course impossible to remove all the conditions of disease belonging to the place. They were, many of them, no doubt natural to it, and were climatic. But they could get rid of the impurities which existed in the earth, and they could prevent additions to those impurities: time would get rid of the old evil, and Leicester of its summer diarrhœa.

Professor DE CHAUMONT (Southampton) remarked that the conditions favourable to the growth of the diarrhœa organism were also

favourable to the propagation of cognate diseases, such as typhoid fever and cholera. From the discussion which had taken place the Congress must feel that the finger had been put upon the cause of the disease—an impure subsoil. A remedy of the drainage was most essential, and if it were urged that that was impossible on account of configuration of the soil, he would only reply by referring to Salisbury, where a similar difficulty was overcome with eminent success. If the Corporation of Leicester would take this to heart, and would try and establish a low-ground water system, they would soon put a stop to the excessive rate of diarrhœa. What was required was the reduction of the subsoil water fluctuation to its narrowest limits. If this suggestion were adopted, the disease which has so long been an opprobium to Leicester would be practically eradicated.

Dr. W. E. Buck (Leicester) in reply, said he really thought sewers had very little to do with infantile diarrhœa, inasmuch as it prevailed in many towns long before they had any sewers at all; nor had food anything to do with these specific cases. At first sight he thought that there was something in the statement that houses were built on foundations originally filled in with rubbish, but it was not very important after all, inasmuch as the same practice was pursued by most towns. With regard to the City of Dublin, he should like to know whether there was any evidence to show that it was really waterlogged. Of course it would be an advantage if sewers were originally constructed of adequate dimensions, but that was an absolute impossibility, as no one could tell how large a sewer might be eventually required. Many of the Irish in Leicester suckled their own children, but they dwelt in the most unwholesome houses he had ever been in. Their children not only suffered from diarrhœa, but frequently died from it. The streets near the river were not worse off in this respect than other parts.

Dr. Tomkins asked whether the mortality from consumption in Leicester was at all on a par with the rate of death from diarrhœa? According to Dr. Buchanan's theory, it should be very great.

Dr. W. E. Buck (Leicester) said he should think they could hardly find a town in England where consumption was more prevalent among children than in Leicester, but there were a good many reasons for that.

On "Vaccination versus Isolation, as a preventive against outbreaks of Small-pox," by Surgeon-Major R. Pringle, M.D., late Sanitary Department H.M.'s Bengal Army.

Of all the diseases which may be considered as most successfully treated and defeated by preventive medicine, I think it will be allowed that small-pox, as met and defeated by vaccination, occupies a unique position. The only claim which I would advance to be heard on this subject is the fact that I have probably seen as much small-pox and vaccination as falls to the lot of most medical officers, in a service of thirty years, of which the last twenty have been entirely devoted to this branch of sanitation in India, the home of small-pox, where the disease is worshipped in the form of a goddess, and where in some parts inoculation has been practised from time immemorial. I trust, therefore, what I may be enabled to advance upon this most important subject, as the result of the practical experience and personal observation of that long period, under such peculiarly favourable circumstances, may prove of practical benefit and assistance to all engaged in the extinction of this most loathsome and fatal scourge, which of all eruptive fevers seems to be the most infectious and contagious. As regards the prevention of an outbreak of small-pox by means of isolation, I have perhaps a peculiar claim to be heard on this point, because in 1863, when small-pox was admitted into the cantonment of Morar-Gwalior, where I was in medical charge of a battery of Royal Horse Artillery, I volunteered, as vaccination was impracticable, owing to the heat of the weather, to limit the outbreak to the few cases first attacked with the disease. This offer was accepted, and I collected them into a tent, which I had pitched to the leeward of the station, and though these admissions extended over a month, cropping up in isolated cases in the centre of cantonments, yet by removing them in the papular or pimple stage of the disease, the infection did not spread, as the cases had contracted the disease from the outside. The outbreak was limited to seven cases, and when the patients had all recovered, I supplied them with new clothes from funds collected by a subscription in the cantonment, in place of the ones I burnt, and let them go to their homes. I

kept the tent standing for some time to see if any more cases of the disease appeared, and when none occurred, I had everything likely to convey or retain contagion burnt with the tent. Months after, the price of this tent was ordered to be deducted from my pay, as I had burnt it without a committee having "sat on it," or rather stood round it. In defence, I explained that I considered the tent not a suitable place for a committee to assemble, adding that I specially selected this tent, as it had been condemned as unserviceable, and if my pay was to be cut, I trusted it might be at the rate for which these condemned tents sold by auction, but respectfully solicited that, in consideration of the *service* rendered by this unserviceable tent, I might be excused paying for it, which request was ultimately graciously granted, and my pay was not mulcted.

My reason, however, for entering into these details is because my action in this instance finally received the entire approval of the military authorities at army head-quarters, and the measures then adopted, and given in my report, are now those directed by general order to be carried out in the case of threatened outbreaks of small-pox, cholera, and similar diseases. The year following, during my absence on leave, small-pox appeared in the Morar-Gwalior cantonment in a similar manner to that just described, but, as no proper measures for isolation were taken, the disease broke out in many parts of cantonments, and not one regiment could be said to have escaped entirely, whereas in the previous year not one case occurred in any regiment, the seven alluded to were camp followers and their families. The misery and suffering caused by this outbreak in cantonments could be seen and gauged, but who will tell that which resulted from the cases of small-pox, which escaped from the cantonments to spread the disease broadcast over the country at a time of the year when, owing to the heat of the weather, vaccination could not be practised?

The town of Leicester, in which the Sanitary Institute of Great Britain holds its annual Congress for 1885, is one in which the subject of isolation, as a preventive measure to ward off an outbreak of small-pox, possesses a peculiar importance and interest, as it must be allowed that by a system of isolation, including the special treatment of the cases of small-pox, the isolation for purposes of observation of suspected as probably infected cases, the disinfection of houses, and all substances likely to hold or convey the infection of small-pox, the town of Leicester enjoys an immunity from epidemic small-pox, which, when its unprotected condition is taken into consideration, is most remarkable, and exhibits a proof of what can be done by a Municipal Sanitary Committee, when it is cordially

supported by the inhabitants of the town in stamping out this most infectious and contagious of the ordinary eruptive fevers. So successful has this system of what I term isolation been, that it is advanced as affording sufficient reasons for rejecting the present scheme of compulsory vaccination, on the grounds that the same object has been attained, viz., the stamping out of small-pox without having recourse to a system which is charged by its opponents, whose head-quarters may be said to be Leicester, with not only being defective in the attainment of the object aimed at, but with what is the more serious charge of a wholesale poisoning of the constitutions of thousands of helpless children, this being done compulsorily under fines and penalties.

In all that I shall hereafter say, I am particularly anxious that this subject should be treated and discussed with a due consideration for the feelings and prejudices of others, and if the present system of compulsory vaccination requires revision, owing to visible defects in the manner in which it is carried out, by all means let this be done, and these defects fairly faced, and, if possible, removed, that the true benefits of the greatest boon to mankind may be exhibited, not in sheets of statistics, but in what may be called *visible* results and benefits, as exhibited by the complete absence of the small-pox-marked faces, telling of those who have survived the attack, but leaving untold the tales of death and misery which each small-pox-marked case points to in India, and, I doubt not, in this country also; to the former of which I shall allude hereafter. In alluding to the benefits of the first preventive measure, viz., vaccination, as I shall probably describe them, where vaccination has been carefully and systematically performed for a series of years, in terms which might by some be considered extravagant, perhaps unwarrantable, I feel some explanation is necessary for what will be viewed as the remarkable absence of statistics from this paper.

Sanitary statistics, speaking generally, and vaccination returns in particular, require so many conditions to make them of use, and so many more to make them absolutely reliable, that before they can be accepted as data, they must be carefully examined and tested by other statistics, whose value has been *visibly* proved. Twenty years of vaccination statistics in India, if I may judge by the North-West provinces of India, of which I have a personal knowledge during that period, have satisfied me that, as a rule, those vaccine statistics are not only worse than useless, but are absolutely misleading. So readily however have they been accepted as true, that in some cases departmental promotion up to the highest grades has been

given, for what the Government of India, when the imposture was laid bare, stigmatised as "a wholesale fabrication of returns." Judging therefore from what I have seen and known, if I were asked what opinion I have been able to form, if any, regarding the benefits of vaccination, as they appear in the published reports of the Government of India, I should unhesitatingly say they were to a serious extent quite unreliable, and, owing to the extensive outbreaks of small-pox in some districts, such as gravely to shake the faith of every true believer in vaccination. When, for instance, you know of districts with populations of upwards of two-thirds of a million, and the birth-rate vaccinated, *on paper*, for years, and yet small-pox epidemics constantly occurring in them, what other conclusion can possibly be arrived at? To shelter these unsatisfactory results behind the shield of worn-out protection, or the neglect of re-vaccination, is, in my opinion, unworthy of the science of medicine, which in this case would have to alter its laws to suit the bad work of careless or ignorant vaccinators, or the false work of unprincipled ones. Where really good vaccination has been carried on for any number of years, the protection imparted is in exact proportion to the ratio between the birth-rate, and the number successfully vaccinated: if the birth-rate is sufficiently reached by successful vaccination, and small-pox occurs in any but isolated unvaccinated cases, then the work is bad, or the returns false, or both. I am perfectly satisfied on this point, having proved it incontestably, and this exemption from small-pox, with a sufficiently approximated birth-rate is, I have found, attainable, without the performance of a single case of re-vaccination, during twenty years of my own practical experience and personal observation in one sanitary circle, with a population of ten millions, and a birth-rate of half a million.

I feel compelled to preface what I have to say with these remarks, as it is melancholy to think of the condition into which vaccination has lapsed in the North-West Provinces and Oudh, owing to *quantity* not *quality* being the stepping-stone to promotion. I did my best for years to stem this tide of false vaccine returns, by declining at considerable risk to my promotion, to have anything to do with re-vaccination, but without avail, and when I disclosed the whole system in 1880, this exposure was systematically suppressed. I distinctly informed the Government of India that if, after this exposure, they allowed the officer mainly responsible for its suppression from 1880 to 1883 to retain his appointment, I would resign, and, as they retained this officer, I resigned the service rather than have my name longer associated in any way with what the Government of India described in an official document as a "wholesale

fabrication of returns." Before resigning, however, I drew from the Government a statement, that my circle of vaccination was exempt from these charges, and that no question had been raised even regarding the correctness of my vaccine returns. In self-defence I record these facts; this exposure is public property, and it is possible that, without this vindication, my uninterrupted labour for twenty years in one circle may be classified with what the Government has stigmatised as above, and the conclusions I have formed on the results of my work be looked upon as valueless as these vaccine statistics.

Perhaps I can best discuss the relative merits of vaccination and isolation by asking and answering two questions:—

1st. What is small-pox in India?

Answer. A universal disease, leaving where inoculation or vaccination are not practised its *visible* results on 95 per cent. of the adult population.

2nd. What is cow-pox (vaccination) in India?

Ans. That which can be made a similar universal disease, imparting, where it is carefully and systematically practised, an immunity from small-pox, such as even its great discoverer could never have expected, because he could not have supposed the prophylactic could have been subjected to such severe tests as it has to meet annually in India.

The answer regarding the universality of small-pox in India may appear to many in this country startling, if not incredible, but vaccination, notwithstanding all it is charged with, has resulted in an absence of small-pox which, I fear, has occasioned ignorance, which has produced indifference as to what small-pox is, when unchecked by inoculation or vaccination, and I shall now try to throw some light upon this ignorance, if only in all kindness to warn Leicester of what may be near it with its hundreds of unprotected children. I shall not, however, exhibit this by means of statistics, showing the deaths from small-pox where the disease is unchecked, though if there are any sanitary statistics in India which may be accepted, they are those of small-pox mortality, for the following reasons. There may be doubts as to what is true and spurious cholera, what is simple fever, fever of starvation, jail fever, or fever with typhoid symptoms; but a death from small-pox is a death from small-pox and no other disease, because chicken-pox as a rule is unknown in India, except as an adult disease, and therefore rarely fatal, whilst small-pox is a disease of infancy, or under puberty. Further, there was no reason to conceal deaths from small-pox as there was deaths from cholera. The inquiries *then* and *now* made about cholera and tabular statements called for, often tax an overworked European official very considerably,

and if he shows this, the natives are not slow to see it, and act accordingly, thus accounting for the remarkable freedom of some localities from the fatal scourge, when it is prevalent in the neighbouring districts. Now, however, that vaccination is made compulsory, under certain conditions, this system, unless carefully carried out, will lead to the concealment of the disease, for fear of the infliction of compulsory vaccination, with its fines and penalties.

The twenty years, however, over which my observations extended were years in which, in some instances, the poor ignorant villagers, who, worshipping the scourge as a goddess, pointed to the few children left to vaccinate with an expression of religious resignation; the goddess of small-pox, "Seetla" by name, had taken their children, and it was with difficulty I could persuade them in some instances, to accept vaccination to preserve a remnant in their village. When therefore we read of 170,000 deaths from small-pox in a population of forty millions in one year, we may be sure this number at least died of small-pox and no other disease, or when in 1863 in the city of Muttra, with a population of 44,000, small-pox in two months carried off 3,500 children, a fact vouched for to myself by the medical officer of the district, some estimate may be formed of the mortality from small-pox in an unprotected population. In Muttra in 1883, a year of equal small-pox prevalence as 1863, not one fatal case was recorded from this disease—but here I had been vaccinating for twenty years with the cordial support of the people of the town.

The only figures I shall give resembling statistics are those to show the universality of small-pox in the North-West Provinces of India, and they are more *visible* results than compiled statistics.

The inquiry was carried on between the years 1861 and 1872 in certain jails in the North-West Provinces of India, where the records on the subject of small-pox had been carefully kept.

Total number of prisoners examined 268,445.

		Per cent.
Number exhibiting visible marks of small-pox	228,964	or 85·29
Number with doubtful marks	20,480	„ 7·63
Unprotected	12,215	„ 4·55
Inoculated	4,233	„ 1·58
Vaccinated	2,553	„ 0·95
	268,445	100·00

Now, in a country where chicken-pox is a rare disease, the doubtful cases may be classed with the small-pox-marked cases,

bringing up the total to 90 per cent., while the unprotected—*i.e.*, unmarked—cases would, had the examination been carefully made, no doubt have showed a few small-pox marks, which would bring the percentage to nearly 95, and, I may add, the condition of the jail population as regards small-pox may be taken as nearly similar to that outside of the jail. This universality of small-pox is no doubt due to the regular annual appearance of small-pox, and I do not think two per cent. could be found to be proof against this annual visitation, more especially as no isolation is thought of, and at the small-pox festivals children covered with the disease in every stage of the eruption mix freely with those as yet free from it.

Now, if we examine the schools, we find between 50 and 60 per cent. are visibly marked with the disease, this smaller percentage is due to the fact that the children of the better classes enjoy, by means of their isolation while young, a certain immunity, which, however, unless they are vaccinated or inoculated, they soon lose as adults, when they have to go into the world and encounter the infection and contagion to be met with in the villages, streets, and markets. What would be thought in this country of parents withholding from their child its chance of succession to property till it had suffered from small-pox, and recovered, as, not till then is its life calculated upon, so as to require provision being made for it. When I began the system of voluntary vaccination in my circle in 1864, at first only the children of the lowest castes were obtainable for the operation, and in villages where female infanticide was practised, and which were thus under the Act to prevent that practice, the *girls* were submitted for vaccination in the hopes, I presume, that they might die from its effects. The very opposite, however, was proved to be the result, and while the boys in these families were swept off in numbers by small-pox, the vaccinated girls lived! These tactics had, therefore, to be changed, and the girls are now kept from vaccination in hopes that they might die from small-pox, when no questions are asked! I have seen a gap in the population due to an outbreak of small-pox, *i.e.*, only a few children between the years of 8 and 12, though there were numbers under 8 years. With the present beneficial effects of vaccination such a force of infection and contagion is impossible, but there is no reason whatever why Leicester some day may not be visited like Muttra. When the cases are few the contagion can be stamped out, but it is quite a different thing when the numbers increase, and the first failure of these measures of isolation to limit, and then stamp out the disease may prove terribly disastrous, and after this picture of small-pox, where protection is unknown, or very limited,

Leicester cannot say she has not been warned. It must be borne in mind, when alluding to the success of isolation in Leicester, that it is mainly due to the success of vaccination *outside* the town, which only admits of the few isolated cases attacking the fortifications of isolation almost singly. These attacks are easily, comparatively speaking, successfully resisted, but if the opposition to vaccination increases around Leicester, and the number of unprotected become greatly increased, the attacks will have to be met at numerous points, and I question if they will then be successfully defeated. When, if once the enemy gets into an unprotected town like Leicester, it will, I feel, fully repeat the tales of death and misery I have seen in India. Again, what is to prevent the unprotected cases leaving Leicester like the boys in the schools in India and afterwards suffering from small-pox, except the acceptance of vaccination in the places in which they live? In short, to take the entire credit of stamping out small-pox by means of isolation is not fair to vaccination, which with all the false charges which have been brought against her, has yet returned good for evil to an extent which only those can calculate who have seen small-pox raging where vaccination is either unknown or but rarely practised.

I will close this portion of my paper by showing what careful and systematic vaccination can do in the home of small-pox. What would be thought in this country, of children covered with small-pox, at the most infectious period of the disease, running about at the washerman's village, among the bundles of clothes belonging to a large military convalescent depôt in the Himalayas, and a still larger civil hill sanatorium, without the faintest attempt at any precautionary measures? But this actually happened in the case of Landour and Mussooree in the Himalayas in 1883, and yet there was no rushing about to get re-vaccinated. Nothing of the sort, a feeling of protection existed, fully justified by not a single case of the disease appearing in either of these stations, in which I had been vaccinating for twenty years without re-vaccinating a single native whom my subordinates or myself had vaccinated during that period. In mentioning this instance, and others, to some professional friends in this country, they admitted that these favourable results were not likely to be met with in this country, in thickly populated localities, and I can quite understand this from the large number of operations performed with "stored lymph." All my work in India was with fresh vaccine lymph, taken by the operator from a vesicle the outcome of his own work; this is what I call careful and systematic vaccination, which will without fail exhibit the triumphs of vaccination. There are

numbers of medical officers in this country whose vaccination is carried on in a similar manner, in whose practice small-pox is unknown, except in the case of a poor tramp passing through the town or village. Let Leicester awake to a sense of its real danger; and perhaps the following may show how its present critical situation may be exchanged for one of conscious security. During the cold season, when vaccination can alone be practised in the plains of India, a few cases of small-pox were admitted from the district into the City of Meerut with its population of 80,000; an enquiry exhibited an alarming number of unprotected children. A meeting was called, at which I promised to remove all this danger of small-pox if all assisted. This they not only promised, but carried out most faithfully, and in five days 2,200 children were vaccinated with a success of 98 per cent. and the supply of children failed before that of the vaccine lymph. This happened about ten years ago, and ever since Meerut has been exempt from small-pox; the visible benefits of these extensive vaccine operations were apparent to all, and my vaccinators experienced no more difficulty in their work. Subsequently this work was repeated in Alighur, Hattrass, and Khoorjah; other instances could be given, but these will, I think, suffice.

I now come to the subject of the preventive measures summed up in the term isolation; and in this city I would draw particular attention to them, as adopted by the sanitary committee to stamp out small-pox, without having recourse to vaccination, and they are certainly most instructive, and should cholera visit our shores will be invaluable, as proofs of what can be done in the instance of the most infectious and contagious of known eruptive fevers, viz., small-pox, when all combine to attain one object; in this case to exhibit the non-necessity of vaccination, as a means of stamping out small-pox. These measures consisted in isolating and treating the cases of small-pox in special hospitals, but as I can quote Mr. Windley's exact words, I think I had better do this. In a letter to a provincial paper dated February 17th, 1885, Mr. Alderman Windley, chairman of the sanitary committee, writes as follows: "In addition to the above," (*i.e.*, the prompt removal to hospital,) "I may say we not only remove any case of small-pox to hospital at once, but we also persuade all the persons who have been found in the house at the time to take up their abode in a separate ward at the hospital for fourteen days quarantine; in the meantime thoroughly disinfecting bedding, clothes, and house from which the patient was removed."

I am satisfied that short of vaccination nothing more could be done to stamp out the disease if admitted, and that this has

been successful, thanks to vaccination outside, need not be a matter of surprise. But what does all this success depend upon? The cordial concurrence and support of the entire community, and the earnest desire of every member of it to act faithfully up to the wishes of the sanitary committee, and to aid them by every means in their power. Now, suppose into this hitherto unanimous community comes a family, the head of which objects on principle to any preventive measures whatever, even goes the length of objecting to treatment for small-pox, and considers isolation, separation for observation, and disinfection, as an interference with the liberty of the subject. Where would this confessedly successful method of stamping out small-pox be, if in this family a single case of small-pox occurred? Have the sanitary committee power to enforce these rules of sanitation, and to isolate this case against the parents' will, and to place the rest of the family "in a separate ward at the hospital for fourteen days' quarantine," or, is it, as Mr. Windley's letter would lead one to suppose, a case of *persuasion*, not *compulsion?* If the sanitary committee have not this power nothing will prevent the disease spreading in a case like the one I suppose, and, like a fire, the greater the number of susceptible cases it finds, the more fiercely and irresistibly will it burn, till it has burnt itself out, or is checked by the barrier of insusceptibility to the disease, which careful and systematic vaccination can alone supply. Further, it must be remembered that though isolation, separation or observation, and disinfection may stamp out the disease if its admission is confined to a few isolated cases, all three will in this country prove utterly powerless if the cases increase in number, or become at all scattered. The triumphs of vaccination at Meerut, and alluded to before, are all placed on public record, and guaranteed by independent and disinterested witnesses, and there is yet time for Leicester to be the scene of one of these triumphs. The slightest carelessness in these measures of isolation might bring Leicester at any time face to face with a calamity worse than many towns in Spain are now suffering from. I have seen cholera and small-pox both claiming their victims by hundreds, and to my mind there is no comparison between these two awful scourges; the unrecognizable victims of the most loathsome of known diseases cannot, I repeat, be compared with those of cholera, where the strong and healthy are struck down as if in battle by an invisible blow or wound, and if they recover they resume their journey with constitutions only temporarily weakened, as I know from my own experience, and not in the least permanently affected; with small-pox it is totally different. Go into a Mahomedhan village near Boolandshur, for instance, and see the sightless

men, and all from small-pox, mostly blind from their boyhood or even childhood, depending for their food on those in many cases living on the margin of scarcity if not want. But why do I say Mahomedhan villages? Because the ties of caste among the Hindoos limit the friends of the blind victim of small-pox; and when scarcity of food is added to all, an unparapetted well or a hugh cart-wheel in a narrow lane in the village too often end the sightless existence of the poor Hindoo lad. I believe very few cases of severe attacks of small-pox ever make good recoveries, and in India, among the poor, the burden of life is not unthankfully parted with in the case of a weakened or crippled child. That which made me in 1864 decide on devoting my whole energies to the relief of humanity suffering from small-pox, was the case of a wealthy banker; he had lost eight children from small-pox, and he brought the last child, a boy, to me, as he had heard that there was an English medicine for small-pox, and would I give it to his last and only child? This must be my excuse for pleading thus earnestly for the children in Leicester.

In closing, I would like if possible to answer some of the objections usually brought against vaccination. These I think can be summed up under two heads, viz., first, the fear of the child's system being poisoned with impure vaccine lymph, and secondly, the discomforts attending the operation among the children of the working classes, whose time is so fully taken up, and who can but ill afford to pay for extra medical attendance on their children, if such is necessary, as the result of submitting them to that which is compulsory under fines and penalties. As regards the first, I am sure if fresh vaccine lymph were invariably employed, and the operator saw the vesicle it came from, we should hear less about these local inflammations and eruptions, and the whole course of the vaccinal eruption would be such as to remove that dread of the operation, which seems to be so general. I am aware that I shall be told that there are cases in which it is simply impossible to operate always with fresh lymph; it is possible there may be such cases, then let the operator know how to store his own vaccine lymph in tubes, as I have had to do and to teach for months every year in the Himalayas, owing to the hot weather in India being fatal to the course of characteristic vaccinia. What can be overcome in India can surely be overcome here in a cool climate, where the vesicle can be carried on all the year round. What I fancy is wanted is practical teaching, not theoretical, the supposed simplicity of the vaccine operation, and the little supposed-to-be-necessary knowledge about vaccination, are the greatest obstacles to the successful carrying out of the scheme; and I am satisfied

that if more knowledge were acquired on the subject, and more care devoted to the primary operation, we should hear less about the necessity of re-vaccination, from loss of protective power by deterioration in the lymph, or lapse of time since the primary operation; and this joint in the vaccine armour, through which alone it is assailable would be for ever closed up. We hear now-a-days of the frequency of alarming symptoms following re-vaccination, and I am not the least surprised at it; much of the calf lymph now in use is largely made up of serum, the result of local inflammatory action, squeezed out by the clamps or forceps on the vaccinal eruption, after all the lymph has exuded, and to insert this serous fluid into the system of a full-blooded, perhaps well-fed, and stimulated adult, without preparation, or caution as regards diet or exercise of any kind, appears to me a very serious undertaking, and I have seen it produce alarming results in some particular cases. After a considerable study of the subject, I am decidedly of opinion that inoculation scientifically carried on, by cultivated lymph from selected eruptions, without any thought of repetition of the operation, is infinitely preferable to vaccination with re-vaccination every seven years, or whenever there is a small-pox scare. For twenty years I have devoted my entire energies to supplanting inoculation by vaccination, which I should never have done had I believed in the necessity of re-vaccination. As I have never practised re-vaccination, and yet expelled small-pox from towns, cities, and districts, wherever I have sufficiently approximated the birth rate with successful vaccination, I am not likely to practice inoculation, or recommend it, having secured all I want by careful and systematic vaccination. When trying to supplant inoculation by vaccination, I found an objection raised to my vaccinator not being at hand if required to see a case; whereas, the inoculator lived in the village where he was operating till all the cases had recovered. I pointed out to these people that after inoculation small-pox appeared in many cases, and some of them were often very serious ones; with vaccination this never happened, and the worst that could occur was the part operated on, owing to heat, flies, dirt, &c., sometimes taking a considerable time to heal, but I said the vaccinator would operate in the neighbouring villages in such a way that he could be readily found, and would attend and treat the case if necessary. This quite satisfied them, and except where the vaccinator was clearly to blame I never had any trouble under this head. I would therefore ask only those best qualified to speak on this point, if these objections are similarly met in the practice of compulsory vaccination in this country. The upper classes can have their children vaccinated by their own

doctor, and, if necessary, attended by him; simple justice therefore demands that that which is compulsorily enacted, and may require on that account medical attendance, in the case of the poor should have the same means of alleviation *gratuitously* and *ungrudgingly* supplied by the State, which the rich can secure by payment. I am aware that the great obstacle to all this lies on the score of expense; but take the case of London, who will calculate the expense and misery attendant on the small-pox hospitals of the metropolis, and the removal of patients to them? Exceptional circumstances must be met by exceptional measures, and I feel that the worst way to treat small-pox epidemics is by the erection of large small-pox hospitals. Let there be a staff of public vaccinators, specially trained to work with fresh lymph, for which they alone will be answerable, exempted from all other medical duties, and then there will be less chance of erysipelas appearing among the lately vaccinated cases, the people will see an increased attention given to their comfort, in the compulsory carrying out of that which is designed to protect the public from small-pox, and the valuable assistance of the parents will be secured, which all who have practised vaccination extensively know the importance of, when collecting lymph for future operations.

As regards the possibility of imparting other diseases with the vaccine lymph employed, I am, of course, aware of the experiments on the subject, and the opinions generally expressed, but, judging from my own experience, which I suppose is as extensive as that of most, I have not met with a single case in which vaccination could be charged with the introduction of any injurious germ whatever. The *very few* cases in which alarming and distressing eruptions have followed the operation in young children, have been due to the lighting up of that which had been *inherited*, not *inserted*. I desire to speak most positively on this point, as I have satisfactorily proved it in every case which has occurred in my practice, or that of my vaccinators, and which have been reported and seen by me. I have met with two cases; one, that of a pure European, and the other a Eurasian, in which I declined to vaccinate the children, unless vaccination was held blameless for what might follow the operation, as it would clearly be shown to be due to hereditary causes. With this I will close, and can only trust that what I have said, and which is the outcome of practical experience and personal observation, not statistical data and theoretical conclusions, may prove to be of practical benefit and assistance.

Alderman WINDLEY (Chairman of the Leicester Sanitary Committee) said the reader of the paper had come to curse the system of isolation, but started by blessing it, showing that he had stamped out at least one outbreak of small-pox in India by its means. He agreed with the lecturer as to the comparative worthlessness of vaccination statistics, but doubted his assertion that the success of isolation here was due to the success of vaccination outside the town. As to the warnings which the lecturer had given, they had heard them many times before; and while they did not alarm him, they might act as a stimulant to increased vigilance on the part of the sanitary authorities. Dr. Pringle, having been connected with the army, would know what would happen to a sentinel if he should be found asleep at his post; and so he should say public opinion would condemn the sanitary authority here if they allowed any laxity to take place in their mode of dealing with small-pox. He had not a word to say in disparagement of the interesting statement made by the lecturer as to the success which had attended his vaccination in India, that statement would no doubt have due weight with the public; but he was in error in supposing that the system of isolation adopted in Leicester was instituted in order to stamp out small-pox without having recourse to vaccination. It was adopted at the suggestion of the late officer of health, who was a firm believer in vaccination, and it was simply to prevent the spread of the disease when it was imported into the town. Leicester was one of the first towns to adopt the Notification of Diseases Act, which had worked satisfactorily. As soon as a case of small-pox was notified, they took immediate steps to remove the case to hospital, to disinfect premises and clothing, and to persuade the occupants of the house where the case was found to go into quarantine for a fortnight. The necessity for this had been proved, as persons so removed were sometimes found in two or three days to be affected with the disease. They had no compulsory power beyond that given by the Public Health Act, which applied all over the kingdom; but if householders refused to go into quarantine they would send an officer every day to inquire at the house, so that the danger of infection should be reduced, and of course it would be their duty to warn persons of the penalties they were liable to if they exposed others to contagion. He would like the experience of Leicester to be made widely known by means of that Congress. In 1852 there were 52 deaths from small-pox, in 1858 there were 53, in 1864 there were 104, and in 1872 there were 346; that was before they had the Notification Act, or any means of efficient isolation; since that time, and under their present method, they had not had a single epidemic of small-pox, and a large number of imported cases had been dealt with, and the disease in each instance stamped out. Therefore he thought that instead of the constant repetition of these terrible warnings as to what might happen, the sanitary authority were at least deserving of something more gracious, not to say complimentary. He, Alderman Windley, was glad to leave medical men to praise or condemn vaccination statistics, and to settle their disputes as to the value of vaccination and revaccination,

and for or against vaccination from the calf; what he found was that the outcome of the system of vaccination was repeated failure. In proof of this he quoted the following sentence from a recent report of Dr. Seaton, officer of health for Chelsea:—"The ratepayers of London have spent millions of money, and small-pox, the disease which should have been limited, if not prevented, has, during the last few years, been worse than ever in its ravages." With that state of things he, Alderman Windley, would contrast the experience of Leicester, and he claimed that what Leicester had done other large towns might do. At London it was not possible, while they had thirty-nine different authorities, who did not act together in this matter.

Prof. W. H. CORFIELD (London) having complimented the sanitary authority of Leicester upon insisting on the isolation of small-pox cases, said it was possible that a general belief in the efficacy of vaccination had led sanitary authorities to be to a certain extent negligent in the matter of small-pox cases. When it was said that isolation was preferable to vaccination, he must reply that the two things were not to be compared in that way. Isolation and vaccination must go hand in hand, and the time must come when isolation alone without vaccination would be totally unable to deal with small-pox. When that time came there would be a terrible awakening for Leicester. He presumed that vaccination statistics were as good as any other statistics. Statistics were the application of figures to the facts they had before them. Every science was perfect as it was amenable to mathematical processes. Every science was more perfect as it became amenable to the application of figures. Statistics were at present nearly the only form of mathematical test that could be applied to the facts of public health. Of course they might be falsely interpreted by those who did not understand them, but he thought no one could look at the remarkable figures published in the German Vaccination Report without seeing that they told a very plain tale. Up to the year 1873, small-pox was rife in the German and Austrian armies. In March, 1874, the Reichstag passed a law making vaccination and re-vaccination compulsory throughout the whole of the German Empire. The result was that since then there had been hardly any small-pox in Berlin, and while in the German army there had been a slight amount of sickness, there had not been a single death from small-pox in the whole of that vast army up to the present time. Surely anti-vaccinationists did not know what small-pox was in the last century, when it was a disease which caused one in twelve of the deaths from all causes. In 1796, when it was most fatal, it caused no less than 184 deaths out of every 1,000 deaths from all causes in this country. It slew one-fifth, and in its confluent form one-half, of those whom it attacked; it caused from one-half to two-thirds of all the cases of blindness in Europe, and disfigured those it neither killed nor rendered sightless. Thus the whole people in the last century was practically a pox-marked race. Anti-vaccinationists seemed to forget that this disease became so prevalent, and was so universally distributed, that the most

extraordinary method was taken to meet it. That method was the inoculation of healthy persons with some of the poison of this terrible disease—one of the foulest diseases that has ever appeared on the face of the earth. This plan was discovered in China, and was imported into this country from Constantinople by Lady Mary Wortley Montagu, and it was employed throughout all ranks of the population, and extended even to the royal families. The royal family of Sweden and that of our own Sovereign, George III., were inoculated with small-pox. That system of inoculation had but one meaning. The fact was it was not worth anyone's while to wait until he caught the small-pox. The disease was so widely distributed among the whole population that it was better to be inoculated with the poison, to have the disease in the milder form given by inoculation, and to be protected for the rest of one's life. As to revaccination, it was demonstrated by Jenner himself, the discoverer of vaccination, that both vaccination and revaccination were necessary. For fifteen years after Jenner practised vaccination there was no case of a vaccinated person contracting small-pox. After that time some cases did arise. The statistics that had been gathered from various armies throughout Europe, had proved beyond all contest that revaccination in riper years was necessary as a complete preventive of small-pox. That vaccination was an almost absolute preventive was shown by the fact that during the 1870-1 epidemic, out of nearly 15,000 cases treated in the London Hospitals, there were only four which showed proof of revaccination, and these were mild cases.

Mr. F. T. Mott (Leicester) said he was in favour of vaccination, but one of the arguments of the anti-vaccinators, viz., that small-pox was dying out, as all other plagues had done in their turn, had not been definitely answered, and it would be useful if the lecturer would answer it.

Sir Charles Cameron (Dublin) addressed the Congress, and in the course of a humorous speech said that there was no population more thoroughly vaccinated than the Irish people, and a population free from end to end of small-pox. He thought that perhaps a little too much had been claimed for vaccination. All that they could claim for it was that it lessened the susceptibility to contract disease when it was epidemic, and enormously lessened one's chance of getting the disease. He had found from investigation that in the case of persons vaccinated the disease ran, as a rule, a much milder course.

Dr. Alfred Carpenter (Croydon) commended the measures taken by the Leicester Sanitary Committee for the repression of small-pox. They were measures which ought to commend themselves to the attention of all other sanitary authorities in the kingdom. The steps taken by the Leicester Sanitary Committee corresponded somewhat with the measures that were taken by a local authority in endeavouring to repress fires. It was requisite to maintain a certain fire brigade

arrangement, so that when a fire attacked inflammable material it might be put out before it reached any very large dimensions. That was an absolutely proper course to be taken, but there was another course that could be followed, and that was to make the material non-inflammable. Thus by vaccination it was proposed to make the human body non-inflammable to small-pox, in order that there might be no propagation of disease. It was urged that statistics should be put on one side as not always trustworthy, but he would give some particulars that were absolutely unimpeachable. Last year he, Dr. Carpenter, with about 25 medical men, went down to the camp at Darenth, where there were more than a thousand cases of small-pox under treatment. They went among the cases, examined them, saw their character. The whole of them were there for some hours, and became thoroughly permeated with small-pox germs, and yet not one out of the whole number was affected by the disease. Send twenty-five men who had not been made non-inflammable down to the small-pox hospital at Darenth in the same way, and he would guarantee to say that at least four of them would go into their coffins in consequence of their visit. It was quite true that vaccination was not entirely protective, nor was small-pox itself. Cases of small-pox among people who had been properly vaccinated were exceedingly rare, whereas he had known of people who were small-pox marked having the disease a second time to a very considerable extent. The inhabitants of Leicester and other towns in this country appeared to know nothing of the ravages of small-pox in unprotected districts. He should like those gentlemen who were earnest anti-vaccinators to be compelled to take the nursing of two or three cases of confluent small-pox in persons not vaccinated, and then compare such cases with the confluent form, which was, however, exceedingly rare, in those who had been protected by vaccination. If after that they did not become true earnest desirers of vaccination he should be extremely surprised, for he could assure those who knew nothing about small-pox there was nothing so horrible, nothing so terrible as that disease occurring in a confluent form in the unvaccinated. The vaccinated, on the other hand, when attacked, got through it in the most comfortable and satisfactory manner, and suffered none of the horrible torture and results which were the fate of the unvaccinated.

Mr. J. T. Stephen congratulated the Sanitary Committee on the *modus operandi* they had adopted for treating small-pox. He pointed out that cases of infection which had appeared in Leicester had invariably been introduced from other towns, and contrasted the state of the borough with the condition of other boroughs where vaccination met with little resistance. He thought the Sanitary Committee were going the right way to work, and he trusted that they would continue to practice the methods that had been adopted, while he endorsed the suggestion of Alderman Windley, that anti-vaccinators should be treated a little more leniently by the magistrates.

Professor de Chaumont, M.D., F.R.S. (Southampton) remarked

that the system of inoculation of the last century was certainly not a benefit to the community if it were to the individual, as the individual inoculated was often the centre of infection, and made the Government press forward the system of vaccination. The sudden and remarkable way in which the disease ceased and continued absent for many years was a distinct proof of the efficacy of vaccination, although experience had shown that the vaccine influence was not entirely protective throughout the whole course of life. He thought they might well congratulate the Sanitary Committee of the Corporation of Leicester on what they had done for the isolation of disease. Their action had been admirable, but they were only carrying out what had been insisted upon by the medical profession for a long while. They had dealt successfully with a fatal and contagious disease, and he hoped their example would be followed throughout the country. They could not, however, say that that was a reason for giving up vaccination. The success attending what had been done in the borough should encourage all others, as far as possible, to carry out measures of isolation and other sanitary preventive measures which would tend to the diminution of the disease. He could not, however, go so far as Alderman Windley, that that was a reason for mitigating the penalties. The law ought to be carried out thoroughly, and he saw no reason why the cumulative penalties should be dispensed with. The only alternative he thought would be that the law should give power to the magistrates to order the child to be taken and vaccinated, but unless the vaccination laws were properly enforced they had better be abrogated altogether, and vaccination left to the common sense of the people.

Dr. A. Ransome (Manchester) referring to the remark of a previous speaker as to the disease existing in one place and being non-existent in another, said that many of them could remember that when the disease of small-pox was prevalent in the Austrian army there was not a single case in an adjoining country. Mere isolation without removing the cause of disease was a very doubtful expedient; and he must point out to Leicester that when contagion crept into unprotected districts not previously visited for some time, it generally carried off enormous numbers.

Surgeon-Major Pringle (London) said, in reply, that he had practised isolation in India because the only expedient he had in the hot season was to isolate small-pox patients; but when he could vaccinate he vaccinated 2,200 children in five days, as he did in Meerut in the cold season.

On "Impediments to Sanitary Progress," by Lewis Angell, M.Inst.C.E., Fellow of King's College, London.

Although sanitation claims to be recognised as a science, it can hardly yet be included among the exact sciences. When we speak of sanitary progress, the results are not infrequently challenged. That sanitary progress means the elimination of extraneous preventible causes of disease, is an abstract proposition to which all will assent, but in the practical application of the proposition we find many shades of difference. For example, the most urgent sanitary question of the day is that of sewage. Sewage in solution in our rivers; sewage gas in our streets and houses. Within the present month the author has had to inspect the condition of a remote borough wherein sanitary principles are almost absolutely unknown; in the course of the inspection an informal meeting of the town council was called, in order to convey to the author the respective views of the members upon what they understood by sanitary principles. One worthy alderman asserted that underground drainage was ruination to a town, causing great injury to health, low fevers, &c.; that street ventilators were worse than cesspools, and that it is better to live in an undrained than a drained town. Another of the council declared that the universal adoption of earth closets was the only proper method of dealing with the matter. One was in favour of sending the sewage direct to the sea. Another was for turning it over the land; while yet another pronounced for the retention of the old-fashioned unadulterated cesspool. Such were the author's instructions. Can we be surprised at the differences of opinion among the inexperienced in sanitary matters in the face of the experiments and the failures, the royal commissions, the local government inquiries, and the Parliamentary committees of the past twenty-five years? Just now, during the "silly season," the pollution of the Metropolitan rivers by the Metroplitan and local boards has afforded an opportune subject for the daily papers, and not a moment too soon. We all join in the general confession that we have left undone those things which we ought to have done, and done those things which we ought not to have done, and there is no health in us; but we show no signs of repentance. We separate into sects and parties, each shouting its own sanitary shibboleth.

The object, however, of this paper is not to discuss the sewage question, but to illustrate some of the difficulties of putting into

effective practice those abstract principles of sanitation upon which we are agreed.

Public health legislation was practically commenced in 1848, and added to year by year till the principal Act and various amending Acts were consolidated in 1875. Ten years of experience and advanced knowledge have shown the conspicuous defects of the 1875 Act, as well as the weakness of that mythical and ever changing body of "Lords and Gentlemen," known as the Local Government Board, who "come like visions, so depart;" but the attention of the Whitehall Ghosts* has been called over and over again to these defects, until local authorities, who can afford it, are driven, in despair, to supplement the Public Health Act by numerous local private Acts to obtain those powers which the Imperial Government fails to grant to the country at large. While grasping after the shadow of party politics, we are losing the substance, the "salus generis humani."

But accepting legislation as it is, how frequently is it a dead letter? There are those who, in the language of the Royal Sanitary Commission of 1871, are "interested in offending against sanitary laws, even amongst those who must constitute chiefly the local authorities to enforce them." What was true in 1871 applies in 1885. The notorious Clerkenwell Vestry, to wit. In the remote borough, previously referred to, the site is honeycombed with the most offensive overflowing cesspools, under the very windows of closely crowded cottages; some of this filthy property is owned by members of the sanitary authority; Aldermen who sit on the magisterial bench, upon whose favour the local officials are dependent, and against whom it would be not only useless, but folly for an officer to take action. Of another district, near the Metropolis, within the last fortnight one thus writes to a daily paper: "for years the district has been a gold mine, a happy hunting place, full of game for surveyors, lawyers, contractors, and jerry builders. The land speculator flourished, and the leasehold system prevailed; bye-laws infringed by a member of the board, with the knowledge of the board and its officials, bye-laws broken by friends of the members, openly." Yet another instance, adjoining the Metropolis, in an important district where buildings are proceeding very extensively, the model bye-laws of the Local Government Board have been adopted, and the surveyor has been honestly endeavouring to enforce them, but the speculating builders have

* Sir Charles Dilke, late President of the Local Government Board, in a subsequent speech at Halifax, October 13th, describes the Whitehall Board as a "Phantom Board," which "was never intended to meet, and which never has met, from the day of its creation to the present time."

succeeded in returning a majority of their own class as members of the board to frustrate the action of the surveyor, whose master they now are.

In the *Times* of Wednesday, Sept. 15th, Sir Richard Cross is quoted as having publicly stated that a great difficulty in sanitary progress was by reason of so many rookeries being owned by people who were members of vestries, therefore the efforts of subordinate officials were paralyzed. The same letter gives an account of an undrained property, and a windowless dwelling room, recently erected by a member of the Metropolitan Board of Works. In such cases who is to compel the local authority to discharge its duties? What power have dependent officials? Public opinion, is the glib reply; but we, who know, know too well how local public opinion is manufactured, and what interests control it, what false issues are raised, and above all how utterly indifferent the majority are.

The repugnance of self-taxation, is another great difficulty the sanitarian has to encounter. To the mere "ratepayer," sanitary science means officials, public works, and taxation; an investment which gives no dividend — matters which may be postponed. The value of health, comfort, and prosperity, or the loss of labour and waste of capital consequent upon disease and pauperism, are matters of social economy of which the average ratepayer takes no account; he will endure poor-rates, and tax himself for beer, tobacco, and luxuries, but he will not willingly submit to taxation for preventive sanitary measures. What was said by the late Professor Guy, still practically holds good: "Most of our towns, and all our villages, are still untouched by the hand of the sanitary engineer."

But our municipal system and local government is the very essence of our freedom. With all its littlenesses and serious defects, it would be as useless as undesirable to advocate centralisation, which practically means red tape and bureaucracy. But there should be some power of appeal, some authority for regulating local authorities and parish cliques; an authority intermediate between the parish and the Imperial department. Such a body is obviously the long promised county board which, being local and representative, would command respect, and supply the constitutional machinery for regulating the vagaries of ignorant or interested Bumbledom.

But supposing some Utopian sanitary Authority is willing and anxious to discharge the functions for which it is constituted, what is its experience and that of its officers? First, that a cunning jerry builder, with the assistance of a sharp lawyer, can drive the proverbial coach and four through every clause of the Act. In apparently so simple a matter as proving

bad mortar the builder is always ready with plenty of rebutting evidence of other "practical" builders and surveyors with elastic consciences. The author was present in a case where the Justices decided against the Board because the *balance* of evidence was in favour of the jerry builder, who had brought some half-dozen witnesses against the board's surveyor, who, of course, stood alone.

The Local Government Board have issued a voluminous series of bye-laws involving very much detail and official inspection; the advantage of their adoption is manifest, but their adoption is optional, and there is a great difference between adoption and observance. Further, some authorities assume the right to suspend their bye-laws, deciding each case "upon its merits," consequently there is no certainty, and there is possible favouritism. The Local Government Board give no assistance with regard to staff for compelling the observance of their bye-laws. Large towns, such as Liverpool, Manchester, Birmingham, and this borough of Leicester, so ably supervised by its talented engineer, Mr. Gordon, may supply the necessary staff ungrudgingly, but it is not so everywhere. Ratepayers object to staff, but why should the burden be laid on the rates? London, Bristol, Eastbourne, and West Ham provide effective supervision by means of "building fees" imposed under the powers of private Acts; but it is not every town which can afford the luxury of a private Act of Parliament, and Lord Redesdale, chairman of the committees of the Lords, opposes private powers on the ground that if such powers are right and necessary, they should be included in a public Act.

But my "lords and gentlemen" of the Local Government Board, while strongly urging the adoption of their model bye-laws, have no time or inclination to assist local authorities in the means of carrying them out. To the want of a sufficient and an efficient staff is due most of the sanitary defects of the day, defects which could be obviated by better supervision, the cost of the necessary staff being charged upon those who necessitate it—the property owners.

Among the defects in the Public Health Act is the definition of a sewer, especially the exception made in section 13 of the 1875 Act, which may preclude control over a whole estate of streets. Gas and water companies have an advantage over local authorities. No one can touch their mains, but anyone can open a street, break into a sewer and lay a drain, upon giving notice; that is to say, the officer of the local authority must attend anywhere and everywhere, at the bidding and convenience of the builder, to inspect his drains; very frequently when the officer attends the work is not ready for inspection;

in fact, he may attend half-a-dozen times before the work is ready, but if the officer is not there at the right moment the builder will complain of delay and hasten to fill in his trench. Great indignation is sometimes expressed against the local authority for permitting, as sometimes occurs, a new house to be occupied, without having the drains connected with the sewer; it happens thus—a builder is under no obligation to lay his drains at any particular time. When his plans are passed, he can begin when he likes, suspend building, and recommence at his convenience. A jerry builder puts off till the last any expense he can avoid, laying the drains from the house to the sewer, is an expense which he constantly postpones, until one day, finding a tenant, he lets his undrained house. Unless the surveyor watches these houses day by day he will be defeated. It should be within the power of the sanitary authority alone to break into sewers and execute outside work, as in the case of gas and water companies' services, and it should be an obligation on builders to lay the drains as the first work in a building.

There is no power to require a certificate of the sanitary condition of a new house before occupation. There is no power to regulate the minimum height of living rooms. There is no power to regulate timber round fire-places. There is no power of control over additions and alterations to new or old buildings, an omission which may render all previous supervision nugatory. A party wall, a chimney, a window may have been finished yesterday in accordance with every requirement of the bye-laws, and altered and cut about to-morrow without any power of interference. There is power to require the supply of water to a house, but not to a closet, nor power to prevent the pollution of drinking water. There is not sufficient control over a system of combined back drainage on private premises. The provisions for compelling owners to make up private streets are of the most unjust and unsatisfactory kind.

Whenever there is an epidemic, or a cholera scare, people and the press, at other times utterly careless of their institutions and representation, become hysterical as to local management and local officials. With regard to the officials, the author's experience of a very large number with whom he is brought into contact is that they are active, competent, and interested in their work. The critics would do more useful work were they to direct their attention to the defects in legislation, and to the composition of the bodies under whom officials have to act.

But after all is said about legislation, local bodies and officials, by far the greatest impediment to sanitary progress is to be found in ignorance and self-interest. We have much

more to hope from education than legislation or officialism. How difficult it is to obtain observance of the most simple and obvious sanitary rules in one's own house. We may provide the cottage with the most perfect sanitary appliances, but all is set at naught and misused through carelessness and ignorance. The principles of sanitation is a vital subject, which should be taught in our board schools, our grammar schools, and our colleges. The public is being taught by the Sanitary Institute and kindred bodies. Neither public officers, local authorities, nor parliament, can accomplish reforms which should arise in ourselves. The efforts of the sanitary engineer, the medical officer, and the sanitary inspector, will miss their mark unless assisted by an intelligent appreciation of sanitary principles by the population at large.

Sir CHARLES CAMERON (Dublin) said Ireland appeared very much in advance of England in regard to sanitary legislation, inasmuch as the difficulties pointed out by Mr. Angell did not exist in the Irish Public Health Act. If existing legislative enactments were properly administered it would be found to be quite adequate. Local authorities ought to do all that was necessary by means of a set of bye-laws, for which provision was made in the Act. If the existing Acts fully worked were found inadequate, then it would be time enough to apply for new measures.

Captain DOUGLAS GALTON, C.B., F.R.S. (London), remarked that it was essential to efficient sanitation that the people should see that existing powers were enforced. He commended the provisions of the Bill introduced towards the end of the session for the housing of the working classes, believing it would do more to promote sanitary progress in this country than any Act that had been passed in previous times.

Mr. H. H. COLLINS, F.R.I.B.A. (London), said that the clauses of the Metropolitan Building Act, the Metropolis Local Management Act, and the Public Health Act, were, in his opinion, sufficient to meet most of the cases referred to in Mr. Angell's paper; that it was undesirable, in his opinion, to introduce more restrictions, by bye-laws or otherwise, than at present existed. With some few exceptions, over legislation would defeat the object which the reader of the paper had in view.

Mr. JERRAM (Walthamstow) suggested that a committee should be appointed to frame necessary amendments to the Public Health Act.

Mr. LEWIS ANGELL, M.Inst.C.E. (London), in reply, denied that he had asked for further legislation beyond the amendment of details he had described, and explained that there were some very important differences between the Irish Act and the English Act. What he desired was the extension to the country generally of powers at present limited in operation to the metropolis, matters which could not, as suggested, be dealt with by bye-laws.

On "Sanitary Reform and Voluntary Effort," by F. SCOTT.

Is our present rate of progress in sanitary reform satisfactory? We are inclined in England to draw comparisons between our own and other countries in the matter of sanitary arrangements, and generally to the advantage of ourselves. While such conclusions may on the whole be justifiable, it is to be feared that the habit of reasoning thus followed has a tendency to obscure our view of the highest standard of excellence, if not to paralyse progressive effort. It is notoriously difficult to arouse public opinion with us even to a sense of real danger, and neither our government nor our municipal authorities are ever in advance of public opinion. Hence even the threatened visitation of the country by cholera is not enough to spur the great majority of sanitary authorities into active preparation for such a contingency.

In some few cases where the authorities are urged on by voluntary societies, or where the intercourse with infected districts is so direct as to render the proximity of danger exceptionally vivid, precautionary measures have been taken; but in the great majority of inland sanitary districts the most that has been done is to issue a handbill or poster giving directions for the guidance of householders in case of the appearance of the disease. This action is almost invariably due to the zeal of the Medical Officer of Health, and, in several cases, the Boards who issue such instructions, to my knowledge, fail to set an example to their ratepayers in the matter of removing filth from the neighbourhood of dwellings. The total absence of organisation for the provision of hospital accommodation to meet the requirements of an epidemic of cholera is another instance of the apathy of sanitary authorities.

At the risk of appearing to ignore the fact that I am addressing an audience including many veteran sanitarians, I must, for the sake of sequence of argument, make one or two general observations that are of a somewhat elementary character.

Assuming that all Local Boards and Town Councils were irreproachable as regards the execution of the powers delegated to them, there would still be a vast field of labour upon which it would be out of place for constituted authorities to enter,

viz., the reform of the habits of large masses of the community —habits which are the result of utter ignorance of the laws of health. Such habits, to wit, uncleanliness, intemperance, thriftlessness and vice in various forms, neutralise many of the advantages which, but for their existence, would certainly be derived from recent sanitary legislation. The reform of such habits, as an educational work, is essentially the function of voluntary effort. I do not, of course, allude to the training of the young. The more perfect system of education now in operation under state control (and I may here notice with satisfaction the steadily increasing introduction of hygiene as a subject into the curriculum of schools) may be expected to effect much that has hitherto been left to the efforts of philanthropists; but, just as in the past, much voluntary effort for the improvement of the condition of the masses has of necessity been confined to the aim of preventing the "residuum"—a class hopelessly past improvement—from recruiting its ranks from the class immediately above it, so now must all possible effort be directed to perpetuating the influence exerted in the schools, by removing the counteracting influences in the children's homes. It must not be forgotten that even while school days last, home influences still operate perhaps more powerfully than school teaching, and, as the great majority of the children of the working classes are obliged to leave school at an age when they are most impressionable, their surroundings at the time will soon determine their settled habits. Thus, unless those grown-up, who are susceptible of good influence, are educated in the laws of health (and this is beyond the scope of school boards), the general improvement of habits inimical to health may be indefinitely delayed. For the past eleven years I have been actively associated in an official capacity with the oldest health society in the kingdom—the Manchester and Salford Sanitary Association,—which is still as vigorous and efficient an organisation of its kind as exists, and during that period I have, as a matter of course, closely observed the condition of my own locality, and watched with interest such indications as presented themselves of sanitary improvement or otherwise in the country generally. The conclusion that has steadily forced itself upon me is that the volume of voluntary effort necessary to supply the deficiencies of rate-supported organisation for sanitary purposes throughout the country, is sadly inadequate.

In support of this opinion I may quote the death-rates of all England and Wales for the past 25 years—a period during which a comparatively great development of public interest in sanitary matters has taken place—and during which "a policy of sewage" has been the pride of successive governments. A

reduction of 1·6 per 1000 in a quarter of a century is not a great achievement.

ENGLAND AND WALES.

Years.	Death-rate.	Years.	Death-rate.
1860	21·2	1873	21·0
1861	21·6	1874	22·2
1862	21·4	1875	22·7
1863	23·0	1876	20·9
1864	23·7	1877	20·3
1865	23·2	1878	21·6
1866	23·4	1879	20·7
1867	21·7	1880	20·6
1868	21·8	1881	18·9
1869	22·3	1882	19·6
1870	22·9	1883	19·5
1871	22·6	1884	19·6
1872	21·3		

In view of these facts I am glad of the opportunity kindly given me of submitting for consideration at this Congress, two proposals, the carrying out of which is, in my opinion, calculated to remedy the existing state of things; and I trust that if they do not meet with the support of the Congress, at least the discussion will elicit some practical suggestions for a forward movement. The proposals are—

1. The union of existing sanitary agencies and formation of new ones.
2. The co-operation of the Church in the promotion of sanitary reform.

It seems to me that the formation of a powerful league of existing organisations is a necessary first step. At present persons in various localities who may be wishful to form societies for the purpose of spreading a knowledge of the laws of health have no centre to apply to for guidance and aid in organising. The Manchester and Salford Sanitary Association has supplied copies of its rules and publications, and given advice in many instances, and doubtless other kindred bodies have done likewise; but the details of organisation are, to all but those specially constituted for such work, a great barrier, and nothing short of actual personal help, such as is given by the large temperance, ecclesiastical, and other societies, will do. No existing organisation professes to supply such aid. A Sanitary league, each branch of which would retain its autonomy, would supply the want. The propagandist work would be directed

from the central office in London, and the Sanitary Institute would, if willing to undertake the work, be the natural centre of operations. This league would send out lecturers to break new ground, provide the help for preliminary organisation, supply publications for distribution at a cheap rate, provide lecturers and the appliances for illustrating lectures, circulate the publications of individual branches amongst others, and supply information to various branches on Parliamentary proceedings and other matters upon which it might be desirable to agitate. The branches would organise public meetings when required upon important questions affecting public health, and the central office would focus the influence of the various districts in making representations to Parliament. There are numerous kinds of sanitary reform of great practical importance which might be actively promoted by such an organisation in districts which cannot now be reached. As one instance out of many may be mentioned the excellent movement recently initiated by the Worshipful Plumbers' Company of London, with the object of elevating the status of plumbing as a craft, and by the examination and registration of plumbers securing uniform excellence in a class of work which has long been responsible for much mischief. In Manchester the Sanitary Association promptly recognised the value of this movement—inaugurated at the Conference of Plumbers held at the Health Exhibition last year, and is now co-operating with the Plumbers' Company in arranging for the extension to Manchester and Salford of the proposed system. I would here parenthetically suggest that the Sanitary Institute should recognise and help forward this movement. With such an organisation as I advocate the same action would simultaneously be taken in many of the towns.

I may also mention, as a substantial advantage of such federation, the increased interest likely to be taken in the Annual Congress of the Sanitary Institute, which would doubtless be attended by delegates from many of the branches, and thus attain to much larger dimensions than at present.

But, it may be urged, it would not be feasible to form active branches of such a league except in populous places. If only that result should be attained it would be a great advance; but my second proposal indicates a practical method of spreading a complete network of sanitary organisation, not only over the country districts, but over the towns as well. There is a good deal of sanitary work done by the clergy *con amore* at present, but its results fall immeasurably short of what might be accomplished through the Church by organised effort. Just as in the case of the temperance movement, there were many ardent

temperance advocates among the clergy prior to the formation of the Church of England Temperance Society in 1862, their efforts were comparatively futile; whereas the strength gained by combination of forces and united systematised action has, owing to the admirable organisation of the Church, enabled that society to contribute more perhaps to the marked advance of the Temperance cause than any other kindred body. It is not proposed that a new society should be formed—that is unnecessary. I can see no substantial reason why the Church Temperance Society should not embrace a Sanitary Reform branch, or that the title of the society, which has already been twice altered, should not once more be changed, say to the Church of England Temperance and Sanitary Reform Society. There are doubtless many churchmen, as well as members of other denominations, who do not feel disposed to subscribe to the requirements of some temperance societies, but the basis of the Church Society is wide enough to provide for even non-abstainers who are willing to "*aid in promoting temperance and removing the causes of intemperance.*" This is a pledge that no earnest sanitary reformer need hesitate to take, and consequently there is no objection from the sanitarian's point of view to utilising the Temperance organisation intact for the branch of work in which he is specially interested. To show that the undertaking of such work would not be quite foreign to the aims of the society, I may mention that almost from the outset of its existence certain purely sanitary objects were regarded as within its scope. In a little pamphlet by the Rev. Canon Ellison, entitled, "Twenty-one years' work of the Church of England Temperance Society," it is stated that after some ten years' experience, the promoters of the society were convinced "that if any work of national reform was to be accomplished, something more than mere Total Abstinence Societies would be needed. *The causes of intemperance would have to be attacked.*" Amongst these were included "bad houses, bad water, bad sanitary arrangements, and want of proper places of recreation and amusement." These conditions, it is needless to say, still largely exist (forming indeed a comprehensive sanitary programme), and therefore the society would in no way depart from its legitimate path by undertaking as a prominent feature of its work the promotion of sanitary reform. Indeed it would, I submit, as a matter of policy be a very wise step to take. The obvious importance of sanitary reform in facilitating the spiritual ministrations of the Church, would turn the scale with many clergy not now possessing branches of the society in their parishes in favour of organising them. The society would also attract to its standard many other new adherents engaged in a kindred kind of work,

and once there, the steps to the more advanced temperance pledges would be easy for at least some of them. The meetings of the society's branches too would increase in interest, owing to the variety of lectures introduced, and, most important consideration of all to the society, it would be enabled to cut more effectively than it has done hitherto at what it recognises itself as one of the chief causes of intemperance. The great importance to the cause of sanitary reform of securing the extensive co-operation of the Church, will readily be seen when it is considered what great moral influence the clergy wield, and the numerous means available in connection with parochial organisation, such as district visiting by ladies and others, sick nursing, mothers' meetings, clothing clubs, &c., for spreading sanitary knowledge, and for practically starting persons in improved habits, and encouraging them in their continuance.

Of course the Church organisation could not conveniently be affiliated to the league suggested in my first proposal; but it would naturally work hand in hand with it as it does now with other temperance societies, and that would practically amount to the same thing.

In submitting these proposals, I have purposely abstained from discussing details such as financial responsibilities, &c. Those would have to be worked out in connection with the consideration of various questions that would arise in the process of organisation, but the main object to be kept in view would be to attain the most efficient machinery at the least possible cost. If the Congress approve of the proposals, I would suggest that the Council of the Institute be recommended to take prompt action in ascertaining the feeling of the various sanitary organisations and of the Church of England Temperance Society respectively towards them.

On "Sanitary House Management," by Delorias, Countess de Viesca.

Ladies and Gentlemen,—In venturing to come before you with some suggestions on the above rather wide subject, it seems proper to show first in what way a lady can have any claim to air her own opinions on matters which more particularly belong, or at least are supposed to belong, to the other sex.

Ladies are not sanitary engineers, and the writer has no wish to claim any exception to that rule on her own behalf, but she believes that ladies have some special opportunities which they alone can make use of.

The skill that designs and carries out great sanitary schemes of drainage, town improvement, or healthy house building, is able to go no further than to complete these schemes and have them in good working order, their practical success is dependent on the good or bad use that is made of the facilities that engineering or architectural skill has given.

Thus, a clever architect may design and build a house with all the appliances that his skill and experience can suggest, and make it a domestic "Temple of Hygeia" in theory, but unless the occupiers are able and ready to put all those clever contrivances to their proper use, and to see that they are always kept to that use, and never allowed to break down through "sheer neglect," that palace of health may become the home of dirt, smells, impure air, and all the evils that follow in their train, ill-health of mother and children, ever recurring sickness, and perhaps death.

It is here that the ladies' functions come in. It is the servants of a house whose properly directed work has to keep it clean and sweet. It is the lady of the house only who can regulate that labour, and by adding to it her own intelligent supervision can make it effective for cleanliness, and for the health to which that cleanliness is the first and greatest step.

The writer believes that this Institute, numbering members of all classes, lay sanitarians as well as professional, and appealing to all, has peculiar opportunities of educating the public, the dwellers in houses, to their share of that work to which all must lend their individual aid before success can be counted on as certain.

She believes, also, that when the ladies—the mistresses of the houses—come to see that they *can* do more and *must* do more than merely call in masons and plumbers when drains and pipes go wrong, and that by understanding the conditions that make them go wrong and avoiding these—they can better secure the bodily welfare of their near and dear ones than a legion of doctors: when the Sanitary Institute has taught ladies this, then it will not only have begun but more than half finished the greatest sanitary work of the age.

The writer is not an English woman, and having lived in Spain and France, and managed her household both in Spain and England, she is able to appreciate the *advantages* which the English attention to sanitary matters gives to residents here.

She knows the hopeless state of dirt and smells produced by the utter absence of any sanitary provision in parts of Spain, and for which the people are now suffering so awfully.

She has been the victim of the ignorance of the use of ordinary closets in Paris, where she has seen a proper range of such closets with the wires all cut to prevent the water being used—the recognised mode of getting rid of the filth when it threatened to overflow being to force it through the traps with sticks.

She has long lived in England and rejoiced in the opportunities given there for those who *will* be and live clean; and yet in England she has seen dirtier houses and smelt worse smells than either in France or Spain, arising only from laziness of servants and want of supervision by the mistress.

The want of proper drains, sinks, and closets is a serious evil, but drains, sinks, and closets, neglected and uncared for may, and do, produce far worse evils than their entire absence; and nothing less than constant supervision on the part of the mistress of the house will secure that attention to the petty and unsavoury details of keeping it clean in all its parts which is essential to health.

The writer refers here rather to the houses of the middle classes than to those of the poorer or working classes, though she sees no reason why these latter should not be kept just as sweet and clean as the former—if only the wives and daughters on whom the duty falls were alive to the necessity, and properly instructed as to the mode of keeping them so, and in this instruction the Sanitary Institute should be able to take a leading part.

Having now, as she hopes, justified the position which ladies should hold in the sanitary army, the writer would give a few simple rules drawn rather from her own experience than from theory, and the value of which practice has shown her.

If asked for any general principle she would say: "To keep a house sweet and clean get all useless scraps and rubbish out of it as quickly as possible, and get all the air and sunlight you can into it. Mr. Matthew Arnold's well-known expression, 'sweetness and light,' with one addition, would well sum up the essential conditions for a healthy house. 'Sweetness, light, and air' should be the watchword for sanitary dwellings."

The English "spring cleaning" is a rather significant expression, and the institution itself, however praiseworthy, gives an insight into the reason of many stuffy rooms and dirty houses. It means in fact that *only* at that solemn function are the rites of a proper "turn out" ever performed.

A healthy house should never need "cleaning," for it should be *kept* clean by daily and constant attention. No dust or dirt that can be removed by brush or duster should remain in a living room over a day, special care being given to all the nooks and corners that so quickly harbour "fluff" and dust.

Carpets should never extend quite to the skirting boards of a room, as a corner and the carpet hem together form a nook which is very difficult to brush out. A margin of stained or varnished floor a foot or more wide does not spoil the appearance of the room, and renders it easy to brush out daily what otherwise can only be got rid of by lifting the carpet. Between the skirting and the floor there is usually a space not wider perhaps than a thick penny, but always filled with dirt. This is best avoided by a small fillet of wood so fixed as to round out the corner, but where this is not done, a thin strip of wood pushed tightly in, or even glazier's putty is a good substitute. The joints of flooring boards should be filled in the same way, and the saving to carpets will soon pay the expense of so doing.

To return, however, to the housemaid's work: *all* the lighter furniture should be moved daily to allow of proper dusting and brushing of the floor below; every place where dust can settle should be brushed, such as tops of doors and windows and picture frames. The old-fashioned plan of scattering tea leaves on the floor before brushing it is very good, as it collects the dust which would otherwise only rise to settle again.

Once a week at least the heavier furniture should be moved and the floor and walls behind dusted; this is best done by "turning out" at least one room daily.

The mistress should not be above using brush or duster herself, and showing her maids how and where to look for and get rid of dust and dirt. They will learn much more quickly and readily by her example than from any other instruction, and if she has china or other fragile ornaments, she will avoid vexatious breakage by showing her servants how to properly clean them. Such things are new to most young servants, and they break more from ignorant handling than from wilful carelessness.

Windows should, of course, be opened and blinds drawn up first thing, and, except in very severe weather, should remain open till the family comes down. Nothing so gives the appetite for breakfast as to come down to it in a clean room filled with sweet, cool, and fresh air.

Books in a sitting room are great collectors of dust where not kept under glass; they should be so set on the shelves that the leather dust flap lies close upon their backs, and it is well to have book shelves only just wide enough for the books to stand, or the space behind gets filled with rubbish and dirt.

In the bedrooms the windows should be opened as soon as the room is left in the morning, and at the same time all the bed-clothes should be turned quite down over the foot of the bed to air, and on no account allow beds to be made at once; they should air for at least a couple of hours before being re-made.

All slops should be carried out and emptied when the windows are opened. The dusting of bedrooms should be done with as much care as the living rooms, and even more attention paid to the beds themselves.

Curtains to a bed are bad for the sleeper, and those who accustom themselves to do without them and to sleep with an open window besides—open for a couple of inches at the top is enough—will reap the reward in pleasant sleep, and wake fresh and without headache.

All ladies should learn how to make beds, and learn it thoroughly, that they may be able to teach, and every now and then they should assist the housemaid to do it, and so secure that the mattress is turned daily, the bed thoroughly shaken up, and each separate sheet and blanket laid smoothly and without a crease, and separately tucked in. Sheets are rarely made long enough; they should never be less than three and a half yards for the lower and four yards for the upper sheets.

The lower sheet should be laid *under* and turned back *over* the bolster. The superior comfort of long sheets and a bed so made must be felt to be appreciated. This is Spanish fashion, and better than the English.

The kitchen is the place which needs the most constant care to keep it clean and free from smells. Here perfect order is a great help to cleanliness. Every pan, dish, &c., used in cooking should have each its own hook or place on the shelves, and should be replaced there as soon as cleaned.

As soon as cooking is over each pan or dish used should be partly filled with *cold* or, if greasy, with hot water, and either carried at once to the scullery or left on the stove for a while to make it easier to clean.

All scraps of food or meat should, if reserved for dog or cat, be put away at once in the larder and not allowed to remain in the kitchen longer than is necessary.

All refuse of any kind that can decay and give off smells such as bacon parings, cuttings of vegetables, potato peelings, &c., should not be thrown into the dust-bin but burnt in the kitchen fire, this gets rid of them in the safest and easiest way; the proper time to burn them is directly cooking is over when the fire is bright and hot, then they are quickly consumed and serve to partly keep down the heat of the fire then no longer wanted.

If care is taken in this way never to throw anything but dry ashes into the dust-bin, and to burn everything that would decompose, no fear need be felt of smells from that quarter, and there is less to be got rid of by the scavenger.

It is needless to speak of the necessity for the most scrupulous cleanliness being observed in the kitchen—that every one knows—everything used in the preparation of food should be thoroughly washed, scrubbed and dried each time it is used, and left fit for use again. Silver sand should be freely used in scrubbing pans, but not at the sink, as servants are apt to do, or it chokes the trap in time.

It should be a rule that nothing likely to choke a trap should be put into the sink—such as hair, or scraps of cloth or paper. Water in which green vegetables have been boiled should never be poured down the house sink but always carried to the yard sink and disinfectants should be freely sprinkled daily.

As soon as the washing up is finished in the scullery the sink should be thoroughly scrubbed out and every scrap of waste removed, and then it should be well sluiced with fresh water; the same attention should be paid to all grates and sinks on which refuse is thrown; if so, no unpleasant smells will be felt. Scrubbing brushes should be used freely throughout, as the cost of them is well repaid by a sweet and healthy kitchen and scullery. Wiping cloths should be plentiful and washed out daily. Everything needed in a kitchen should have its proper place ready to hand and be replaced when done with.

Closets are the housekeeper's *bete noire* and require constant attention. Some forms are better than others, but all can be kept clean and sweet by care and attention if not out of order—and when they are, the sooner the plumber comes the better. Proper brushes are made to clean the basin, &c., and the lady of the house should *see* that they are daily and effectually used. Disinfectant powder should always be at hand and regularly used. Slops from the bed-rooms should not be emptied here, as they too frequently are, but always at the yard sink.

What the writer wishes to impress on ladies who have the management of a house is that all these matters are peculiarly within their province and should not be left entirely to servants. It is the lady's business to see that the work is properly done by her servants—not to do it herself, except in the way of instruction—and if some of the duties are not altogether pleasant, yet let her remember that by seeing them properly done she is helping, as only she can help, to preserve the blessing of a clean sweet house to her family, and in that way securing their health so far as lies in her power, and keeping the doctor out of the house.

The writer trusts that she has shown that the part which ladies can take in the sanitary management of houses is no small one, and her own experience enables her to assure them

that it is one which no lady need be ashamed of or unwilling to take. The complaint so often made of dirty, untidy, and unskilful servants would be seldom heard were ladies to take personal interest in training those who come to them. A good mistress turns out good servants, and may in that way influence the future comfort of many a working-man's home.

Surg.-Major PRINGLE (London) spoke of the paper as a proof of what a lady could do, and said, as Chairman of a Sanitary Aid Committee near London, he could bear out the evidence there placed on record of what ladies could do. He knew that if ladies would help in the work of Sanitary Aid Committees they would be able to do infinitely more than gentlemen, because they could gain admission into people's houses and make practical suggestions which the gentlemen members could not. He could go and do a good deal as a doctor, but ladies were received and confided in, and had the opportunity of giving good and kind advice and of exercising an influence which gentlemen had not. He came across an instance the other day in which the sanitary condition of the closet arrangements corresponded with what was reported in the paper. It was simply distressing, and almost merited a stronger word, and, in his opinion, it would be more honest and fair if the word "water" were left out in the description. It was disgraceful the way in which matters of such vital importance were sometimes carried on in the neighbourhood of London, and he alluded to it the other day at Cardiff as one of the most fertile sources of disease. Men going home after a hard day's work were in a condition peculiarly favourable to disease, and if they returned to houses with such defective sanitary arrangements they ran the risk of being prostrated in the prime of life. The bread-winner gone, he need not detail to them the rest of the picture. It was perfectly true that the wire leading to the cisterns was frequently cut, for he had seen it done. The arrangements in the suburbs of London were made with a view to *economy*, and much too frequently one cistern *over the closet* contained all the water used for drinking and sanitation, and when the wire was cut for the closet water, to save it for other purposes, or prevent waste, the condition of this closet can be better imagined than described. In the cases in which he saw this state of affairs existed he got the wire rejoined, but how long would it remain so? If better arrangements could not be made for the action of water in closets, they had better call them simply "closets." With regard to drains of houses, he wished to lay stress on this, that it was just as important for masters of houses to see that their servants were as well, comfortably and sanitarily housed downstairs as the occupants upstairs. If sickness got into the lower parts of the house it would certainly find its way upstairs. In a case where he was consulted the other day the closet arrangements for the

servants were very defective. The engineer attributed it to a lack of cleanliness, but it was found to be due to a disconnection between the basin and the trap, due to the corrosion of the connecting solder, and yet the sanitary inspector called this a water closet in a dirty condition.

Mr. A. M. FOWLER, M.Inst.C.E. (Leeds), said that as a family man, and having experience in sanitary work, it was with infinite pleasure that he heard the paper, because, unless the ladies assisted, he thought their results would fall very far short of the objects they had in hand. He considered one point in the paper very important, and that was the filling up of corners and the joints in floors with putty. They all knew that the germs of contagion were passed from one room to another by the floating motes, and the smallest particles that could not be seen in the ordinary light, but could be seen through the prisms of the sun's beams. They were told there was no contagion of typhoid fever unless they took up some particle that had passed from the body of a patient, and therefore they should be very careful that no particles that came from a sick room passed to other members of the family. If the joints of boards were left open, and dust allowed to accumulate in the corners of rooms, it seemed to him that there must be danger. In following out that view they must come to the conclusion that they had not arrived at the proper standpoint with regard to floors and joists in house building to secure perfect sanitary precautions. It was far better, in his opinion, to construct houses something like the buildings in Victoria Street, Westminster, perfectly fire-proof, iron joists and concrete floors, where not a particle of dust could accumulate or be hidden away: thus making a great stride in sanitary reform. Take, for instance, the case of old property, where death most frequently occurred from emanations. Filth got between the joists, and as time went on it was wafted out again. Builders would not complete the sanitary arrangements of houses, nor do all that was possible to help the housewife to keep them clean if they did not build so that the joists and joints in the floors were made as secure as possible against dust and dirt. With regard to burning up the rubbish in a house, it was already done to a limited extent, but it could not be done thoroughly on a large scale.

Dr. W. J. SIMPSON (Aberdeen), said it was with extreme pleasure he had listened to this admirable paper. The Countess had touched upon one point that really needed reform, and that was cleanliness in the household. No one could exert so much influence in that direction as the ladies. He had often been struck with the aptitudes of servants for putting forty things away in corners—under the staircases and in out-of-the-way places. So that many houses, although apparently clean, tidy and well ventilated, had in these hidden places accumulations of filth that promoted disease. The remarks regarding the turning back of the bed-clothes and bedding so as to allow the whole bedding to become well aired, were very appropriate; no room should be more attended to in respect of ventilation and cleanliness

than the bedroom. Another thing which he had often noticed was that some ladies seemed to think that if a smell proceeded from a sink they could get rid of it by putting a cover over it, showing how little they knew of the diffusion of foul air. It was easily observed how different was the household of a lady who knew something of sanitary principles, as compared with that where there was no such knowledge. The proper training of servants was one of the directions in which ladies could exercise great influence. They had the training of servants who ultimately became the wives of the working men, and carried their habits of cleanliness to the poorer houses. He hoped that more would be done in that direction in future.

Mr. Walter Rowley, M.Inst.C.E. (Leeds), remarked that the remedies for the evils to which their attention had been drawn appeared exceedingly clear and useful for the purpose. The only difficulty that occurred to him was the practical application of the same. He was one of those unfortunate individuals who built a house and attempted to apply hygiene and sanitary law to such an extent as to ensure the health and happiness of the household. The result was that within the last few weeks all his servants had given notice to leave, and distinctly stated that they had not been accustomed to the personal interference of the master and mistress in the sanitary arrangements of the kitchens and outbuildings, and the duties of the housemaid in respect of the sleeping and living rooms. They said even more. The senior servant announced that no experienced servant from a good house would ever come to a house where they were interfered with in a manner so totally different from what was usual elsewhere. He should like to know how such a grave difficulty was to be dealt with. He feared it could not be met until they had a new generation or race of servants brought up under a superior code of training, and therefore mutually interested in promoting views calculated to secure a healthy household. The cry was of course to train servants to know how to deal with these matters, but at the present time they refused absolutely to be instructed or even controlled in any way in these matters, and if we had to wait until a new generation was born who would not mind learning, he was afraid the tenour of their lives would not be as happy and of as long duration as was desirable. Respecting the closet difficulty, he thought he had been successful in dealing with this leading question. His plan secured good internal convenience and external sanitary advantage, by making a covered way to the earth closets, which were situated at an extreme point beyond the living part of the house. By this arrangement the difficulty had been bridged in a manner most satisfactory to every member of the household.

Mr. Jerram (Walthamstow) said it seemed to him that teachers in the board schools thought it beneath them to teach the children the use of sanitary appliances. He suggested that in both the higher grade and board schools the questions set forth in the paper should be taught as a part of the regular education of children. He had

visited board schools where the sanitary appliances were disgraceful, and if children left them to enter service in large houses, imbued with the ideas they picked up at the board schools, he did not wonder at the ignorance shown by domestic servants.

Dr. J. F. J. Sykes (London) added his tribute to the very excellent paper that had elicited so much discussion, and said it confirmed what he had heard over and over again at these Congresses—that they wanted better teaching among domestic servants. It was really a very serious matter. He quite confirmed what Dr. Pringle said. He (Dr. Sykes) had a district under his care with a quarter of a million of inhabitants, and one inspector's time was taken up by making orders to keep the connection between the closet and the water supply cistern. It was quite cruel the way people broke the connections, but the magistrate was always severe about it. There was one little exception he took to the paper. It was regarding open windows. He did not believe in open window tops in this country; people would not open their windows, they would not do it in the middle of winter. There was an excellent remedy for this, and very easily applied. It was to make the bottom bead of the window overlap the bottom of the sash. If the bead were wide enough, they could open the bottom instead of the top and have no draught. There was no mention in the paper of disinfectants in case of contagious diseases, but possibly that was trenching on the confines of medicine. It appeared to him that all disinfection should be done by municipalities gratuitously. Anybody in his district who liked to send could have his room completely disinfected without expense to the householder. It was an excellent system because it encouraged people to have it done, whereas if they had to pay to have a room disinfected they were not so ready to do it. It was also an advantage to the municipal body to have it done, and they absolutely saved the pockets of the ratepayers by preventing the spread of disease. With regard to plumbers being called in, his experience was that they generally made matters worse. The plumbers' guild was taking the matter up, and now they were doing better work; but he thought that ladies should not trust altogether to the plumbers.

Mr. Scotton thought that the one practical thing to consider arising out of the paper was the training of servants. How this was to be done was the great question, and the suggestion that board schools should introduce the system was a practical one. But something more than that should be done, because the bulk of the servants had passed school age, and he thought some system of voluntary teaching was necessary, and something practical in that direction should result from the Congress. It would be well if ladies in country districts would bind together, as they did now for teaching sewing and the like, to spread a knowledge of simple sanitary laws among those who were intended for domestic service.

Mr. Ellice-Clark, M.Inst.C.E. (Hove), thought they should thank

the Countess of Viesca for her courage in bringing forward her paper, and also for having laid down some simple rules, which, if attended to in all houses, would no doubt produce excellent results. It was a great thing that a lady should first take the trouble to prepare a paper, and secondly, that she should deal with subjects which a few years ago would have been tabooed, not only amongst ladies themselves, but also amongst gentlemen in the presence of ladies. A great deal of the discussion had turned on the training of domestic servants. He was engaged professionally in Brighton, where a comparatively larger number of domestics were kept than in many other towns. It was lamentable to see the difference there was between houses where the mistress took an interest in the cleanliness of the house, and where they did not. With regard to the teaching of the uses of sanitary appliances in schools, he thought that a question to which the attention of female teachers should be directed.

Mr. J. Horrocks (Southport), suggested that the paper should be given away or sold at a cheap rate for a number. He believed it would be read more eagerly by English people, because it was written by a foreign lady, and would thus be the means of disseminating sanitary knowledge amongst the very people it was necessary to instruct. He should be very pleased to have copies printed (if permission from the Institute were given), and to distribute them in his district.

Mr. S. J. Barber (Eastwood) believed that many of the evils complained of in the paper admitted of remedy, and that it would be a good thing if the walls, ceilings, and floors of houses were made non-absorbent, which could easily be done. One great evil in the ordinary floor was that it retained moisture for a long time, which was not healthy, especially in bed-rooms. If it were coated with enamel paint it would be perfectly non-absorbent, and would be quite dry after washing. Open joints in floors could in future be avoided if the boards, before being laid, were submitted to a process of seasoning by dessication, a system lately introduced. If ceilings also were coated with paint or enamel a little water would make them clean, and there would be no necessity for white-washing or colouring, and nothing noxious would be absorbed. The ordinary wall papers are very objectionable, as they absorb and retain effluvium for a long time; it would be much better to use paint, or some of the non-absorbent decorations now manufactured. The sink in the kitchen was generally one of the most disagreeable objects in the house. If made of enamelled earthenware, they should be perfectly sweet if properly trapped.

Mr. J. Lemon, M.Inst.C.E. (Southampton), drew attention to the ignorance of the ladies in the middle classes as to the management of their homes. He thought it should be generally understood that in order to have a good healthy house the lady *herself* must be conversant with the details of the management. If this were a little more known

and attended to it would be better for all concerned. Carpets all over a room were a great mistake. Then as to disposal of refuse, he was in favour of sweeping away dustbins altogether. They were wrong in principle. The cardinal principle he laid down was—rapid and continuous removal; and they could only do this by having proper receptacles, to be emptied by the scavenger as soon as possible, and not allow the refuse to accumulate in the vicinity of the house.

Dr. Dolan (Halifax) remarked that the want of proper drains, sinks and closets was a serious evil. He wanted to say a few words as regarded practical legislation in reference to who was to put drains and sinks in order, because he believed that until they had some legislation of the kind all the efforts of sanitary reformers would to a certain extent be impeded. He had spent on his house something like £50 to £70 on improving the drainage, as the landlord declined to do it. Until the law was altered so that landlords were compelled to put houses in a good condition, they were virtually in the hands of the landlords, and in many cases needful sanitary reforms were not carried out because the landlord would not do them, and the tenant could not afford to.

Mr. W. R. Maguire (Dublin) said he always thought, but now he felt sure, that the Sanitary Institute made a great mistake in not endeavouring to induce ladies in the different towns where Congresses were held to come forward prominently and assist in sanitary reform. No doubt ladies required some courage to enable them to bring forward such subjects and offer their advice in a mixed assemblage, but the admirable manner in which the Countess de Viesca had treated this important subject in her interesting paper, might be taken as a model and afford encouragement to other ladies to give the Institute at other Congresses the benefit of their special experience. Some of the speakers seemed to think that suggestions as to the form or construction of the various sanitary appliances should have been offered, but they should remember that the Countess' paper had been written on "Domestic Sanitary *Management*," and not on Domestic Sanitary Engineering.

Sir Charles Cameron (Dublin) said he did not think he had ever listened to a paper in which more home truths were put before them in so small a compass. He quite endorsed all that was said in it, and did not think it was open to any hostile criticism. He believed himself it was better to allow dust to remain harmlessly on the shelves and furniture than to disturb it over the whole room with a brush, rendering the atmosphere extremely unpleasant and even sometimes dangerous. He was in favour of the immediate removal of filth. Even to deposit it in the ground near was dangerous, because it so happened that the atmosphere of their dwellings was very much affected by the condition of the atmosphere of the soil beneath them. There was an atmosphere extending to some 60 or 70 feet below the soil, and it had a tendency to be diffused up into their houses. If the soil about their houses

were impregnated with filthy matters which were so often carelessly thrown out of houses, the air below the soil became polluted and dangerous, and that entering the houses frequently carried the germs of many diseases into their dwellings. He cordially endorsed everything the Countess had said about bed curtains, and also about women's mission in sanitation, believing that women sanitarians could exert great influence. They had a Ladies' Association in Dublin, and he had many opportunities of seeing the good work they did. The improved condition of the houses in the district in which they worked and improved manners of the people, were seen at once. A benefit was also noticed in the improved diet of the working classes, and he believed women were as capable as men of giving sound sanitary advice.

On "Ambulance Work," by J. H. Buckley.

On Oct. 19th, 1880, the late General Burnaby and a few friends interested in the St. John Ambulance movement met at the house of Dr. Buck to arrange for the first public meeting in connection with the movement, and to form a committee for carrying on the work, more particularly in Leicester itself. A *Leicestershire* centre had been formed some twelve months previous, but it was desirable for the more efficient working to have a local committee. When we look at the names of the ladies and gentlemen who rallied round the movement at this juncture we can hardly wonder at the impetus given to the cause. We refer to Dr. Buck, General Burnaby, Captain Grimston, Captain Rolph, Captain Watson, Mr. Farndale, Superintendent of Borough Police, Rev. and Miss Fortescue, the Misses Fullagar, &c. The first public meeting was held Nov. 6th, 1880, in the Lecture Hall, Museum Buildings. Colonel Duncan, C.B., R.A., came as the deputation and presented the certificates. Among the recipients we find the Countess of Lanesborough and Lady King-Hall. Most of the work of lecturing to the classes had been done by Dr. Buck, but as the work grew it became necessary to seek further help. Accordingly eleven of the medical men were applied to for assistance. Only four came forward to offer their services gratuitously. To these gentlemen, Mr. Greasley, Dr. Buck, Dr. Moore, Mr. Douglas, and Mr. Everard, much

of our success to-day is due. Some of the local medical gentlemen, while not able to assist by lectures, have lent their moral interest, and given us their sympathy, whilst one—Dr. Pearce—has placed at our disposal a skeleton to illustrate the lectures. The effectiveness of our earlier operations was felt to be considerably marred by the utter want of any organization or inducement to keep together those who had gained certificates, so that they might maintain a practical acquaintance with the work expected from them. The thought occurred to Mr. H. Brice that a corps, formed upon somewhat similar lines to the Volunteer Fire Brigade, would answer the purpose—every member to hold himself in readiness to render any assistance in his power when called upon, without fee or reward; and in order to maintain a thorough state of efficiency, to meet once a month for practice, and to have an occasional lecture from a medical gentleman. A preliminary meeting was summoned to meet at the High Cross Coffee House in November, 1882, at which a committee was appointed to draw up rules and get out a circular, to be sent to every medical gentleman in the town asking for suggestions, so that the undertaking might be established on as sound a basis as possible.

Thus was formed the nucleus of a society which has done much to popularize the movement in Leicester. An indispensable condition of membership being the possession of a certificate from St. John's Gate.

From this time the progress of the Ambulance movement has been steady and eminently satisfactory. At the commencement of the year 1882, as will be seen from the statistics, the Society was so crippled for want of funds that less work was accomplished than in any year of its existence. Appeals were made through the local newspapers. The committee became a body of collectors; concerts were got up by the railway men and the Ambulance Corps, and such a vigorous effort was made as to bring an accession of funds and an influx of persons anxious for instruction; the result was that in 1883 our work exceeded that of any previous year—223 gaining certificates, this being 30 in excess of our hitherto highest record. The percentage of certificates gained in proportion to the numbers examined was greater than ever. This end was mainly achieved through the assistance of the Ambulance Corps, detachments being told off to attend each course of lectures to assist the lecturer in the practical demonstrations. Here our strength and power for good lies. In this work as in yours, gentlemen, theory without practice is comparatively useless. In all our examinations the ability to put on a bandage or a splint in the proper way and in the right place is accounted far more

valuable and important than the knowledge of names of arteries, veins, or bones. One great feature of our work has been the instruction of the members of the police force and railway servants—two classes of men who often hold the lives of their fellows in their hands. Here success has crowned our efforts in a marked degree, no fewer than 129 policemen and 130 railway servants have gained certificates, while more than twice that number have been under training. Early in 1884 a separate corps was formed, composed solely of railway servants, and provided with stretchers, splints, bandages and tourniquets. By the kindness of the officials, arrangements are made that in ten minutes from notice being received of any disaster on the line, a company of twenty efficient men can be dispatched to wherever their services may be required. While the Railway Corps have thus shown their zeal and love for the work, the Town Corps have not been idle. The need of an Ambulance Carriage for the removal of the injured, or of patients suffering from non-infectious diseases had been long felt. Several cases having come to the knowledge of the committee where persons suffering from serious fractures had been placed in peril from being thrust into cabs, it was determined to set to work at once to raise the necessary funds. By subscriptions, and a sum raised at a concert where all the performers gave their services, the amount required was procured and the carriage was presented to the Mayor and Corporation, for the use of the town, in November last. We need hardly say it has answered all our expectations. Not content with this, another vehicle, to be drawn by hand, has been invented and built by members of the corps. It is intended to place this in a populous neighbourhood for the use of the poor. The experiment, it is hoped, will be but an instalment of a scheme to provide something similar for every poor centre in the town. As such, it will be watched with keen interest by many.

We must not omit to mention the latest local development of the movement. For some years past efforts have been made to obtain an Ambulance Corps for the volunteers, but not till last November did it become an established fact. Ten members of the Town Corps, including the president and vice-president, were duly accepted and sworn in. After the usual drill, they were apportioned amongst the head-quarter companies. In the first week of August they accompanied the regiment to the camp at Blackberry Hill, and did good service. We can hardly refrain quoting from a letter sent by the Colonel of the regiment to the Sergeant in charge: "I saw enough of them in camp to be sure that wherever they are they will do credit to the battalion under my command."

The following figures show the work accomplished:—

	MEN.			WOMEN.		
	Recd. Inst.	Cert.	Inst.	Cert.	Advcd.
1879	142	35	98	23	...
1880	181	28	79	55	...
1881	182	118	141	44	37
1882	25	15	62	30	22
1883	208	159	112	47	17
1884	232	158	200	49	17
	970	513	692	248	93

For 1885, our returns are not yet complete, but we have a grand total of nearly 300 certificates to be presented at our annual meeting on October 15th.

Undoubtedly this represents a large amount of work on the part of committee and lecturers, and the question may be asked, *cui bono?* A mere cursory glance at our occurrence book, in which *some* only of the cases are entered, will show. We select a few haphazard:

1. A policeman found a woman in the canal. On getting her out of the water she was apparently dead. By his unwearied exertions she was, in the course of half-an-hour, restored to consciousness.

2. A boy carrying some sheets of glass up a ladder, fell, the glass severing the brachial artery. A member of the corps stopped the bleeding and saved the lad's life.

3. Once more. A navvy engaged on the flood scheme was passing down Belgrave Gate, and accidentally severed the left brachial. A member of the Railway Corps happening to be just behind, sprang forward, and grasping the man's arm, compressed the artery till a tourniquet could be improvised, when the man was conveyed to the infirmary. The house surgeon told him whoever had put up his arm saved his life. The man was father of a family of little children, and his death would have meant the union for the family for years. One life saved is payment for all the trouble incurred. Who can estimate the value of one life? But these are not the whole of the results following, many are not even reported. We ask for your sympathy, gentlemen of the medical profession, and we appeal to your interests. A live patient is surely worth more than a dead one, and our work is only to try and do our best till your superior knowledge and experience can be made available.

Dr. W. Collingridge (London) said that the ambulance movement was altogether a recent one, and one of the most important movements of modern times. From its inception it had had many difficulties to contend with, and first of these that of dealing with the medical men. They were teaching laymen and women to deal more or less with professional subjects, and there was some amount of opposition to start with. He had been associated with the St. John's Ambulance movement from its beginning, and knew how the difficulties had been met in London, as well as Leicester and other towns. The most important point was to obtain the sympathy of the medical profession. It was felt that when they had the medical profession at the head, interested, when once they saw that it was not only for their good, but also for the good of humanity at large, they had got over the main difficulty. Another consideration was whether in teaching non-professional persons to deal with stoppage of bleeding from the main arteries they would not soon run the risk of doing an immense amount of harm. The whole point was the *way* in which this had been met, and the results that had been obtained. He could show from his own knowledge at least fifty cases in which life had been saved by the intervention of ambulance men, and of course there were many throughout the country where weeks and even months of sickness had been avoided by proper and immediate treatment. In ambulance work they taught non-professional persons to deal with cases in such a manner that they might not become worse before professional assistance could be procured. They had not to heal or repair an injury, but simply give it first aid treatment. He had known one or two cases in which injury had been done. He saw one case in which perhaps it would have been better had the patient been let alone, but to one case where injury was done they had fifty where life was saved, and thousands where material benefit had resulted. There were two distinct branches of the movement. One confined almost entirely to men for the treatment of serious accidents on the railway, in streets, mines and factories; the other, which until the last three or four years was neglected, for the treatment of children and accidents in the household, such as burns, scalds, &c., where ladies were useful. Of late years much attention had been paid to the systematic teaching of ladies in the treatment of ordinary every-day accidents. Here was another difficulty. Many persons were trained to treat accidents up to a certain point who did not come across those accidents, and it stood to reason that they were liable to forget what they had learned. To meet that the St. John's Ambulance had instituted a system whereby periodical examinations were held. If a person passed three examinations, and obtained three certificates, he became a permanent pupil of the Association. He particularly called the attention of ladies to the advanced course of nursing, because he considered that for them it was the most important and interesting.

Dr. W. E. Buck (Leicester) called attention to the Ambulance Corps which had been formed in Leicester, which enabled the members

to keep up their practice, and suggested that a corps of ladies should be formed with the same object in view. He also advocated the provision of stretchers in different parts of large towns for the removal of patients, instead of placing them in trucks.

Sir Charles A. Cameron (Dublin) agreed that it was most desirable they should have institutions of this kind throughout the United Kingdom; but with regard to removal of patients to infirmaries he thought it should be compulsory upon sanitary authorities to provide proper conveyances, the same as they did in the case of infectious diseases. The humane removal of sick people, such as those suffering from rheumatic fever, should engage the sympathy of every one, and he did not think it was the office of societies of this kind to provide things which should be paid for by the community at large.

Dr. C. A. Moore (Leicester) gave instances of successful ambulance treatment of cases which came under his notice at the Leicester Infirmary, and suggested that it would be a good plan if instruction in sanitary principles were associated with ambulance work.

Mr. J. H. Buckley (Leicester), in reply to Sir Charles Cameron: It is impossible to calculate the number of cases in which the members of our different corps have rendered valuable assistance.

SECTION II.

ENGINEERING AND ARCHITECTURE.

ADDRESS

By Percival Gordon Smith, F.R.I.B.A.

PRESIDENT OF THE SECTION.

The very wide scope of sanitary engineering and architecture with which this Section of the present Congress has to deal, and the comparatively short space of time which is available for the address that is expected of me, preclude me from making any lengthy prefatory remarks, or from offering any apologies for accepting the Presidency of this Section. Indeed, I was hardly aware until I began to consider the matter, how very wide is our range of subjects, and therefore I may, perhaps, be allowed to remind you of some of the questions coming within the scope of sanitary engineering and architecture. They include such matters as—

Water supply to all manner of towns and villages.

Sewerage.

Means of disposal of sewage as well as refuse of all kinds.

Prevention of pollution of rivers and streams.

Preservation of purity of the atmosphere.

The formation of cemeteries and mortuaries, and arrangements for the disposal of the dead.

Open spaces in towns.

Clearing crowded parts of cities and towns.

Providing wholesome dwellings at moderate rents for the poorer classes, in the country as well as in towns.

Then there are innumerable other matters, as abattoirs and slaughter houses, markets, baths and washhouses, free libraries, common lodging houses, crêches, &c., which directly or indirectly affect the health of the people. Beyond these again, we have the intricate detail arrangements for carrying out these several matters in a proper manner, the street paving, scavenging, watering and cleansing; the drainage, water supply, ventilation and other points about our domiciles; the distribution of the various parts of our institutions for insuring the greatest hygiènic advantage, whether in the school, hospital, asylum, prison, barrack or workhouse. All these (and others could be mentioned) are among the subjects which we may have to consider, and I think I have said enough to make you agree with me as to the magnitude of the subject. It is quite beyond my power, even did time permit, to deal in the most cursory manner with all these subjects. I therefore propose to touch upon only a few of them, and in doing so, to endeavour to review very generally the present condition of certain sanitary works in the country—to "take stock," so to speak, though necessarily in an imperfect and incomplete manner, of the work that has been done under modern sanitary legislation; to see how far we are making progress, and whether that progress is such as can properly be regarded as satisfactory.

The legislation of recent years would seem to have given a great impetus to sanitary progress. It is stated in a recent Annual Report* of the Local Government Board that the total amount of loans which were sanctioned by the old General Board of Health under the Public Health Act, 1848, up to 1st September, 1858, when the Local Government Act, 1858, came into force, was £2,956,178, and the sanctions granted by the Secretary of State under the latter Act, and the Sewage Utilization Act, 1865, prior to the date of the constitution of the Local Government Board, amounted to £7,363,366. Thus in the twenty-three years prior to the constitution of the Local Government Board an aggregate sum of £10,319,544 was authorised, while in the first thirteen years of the Local Government Board a sum of **£29,890,353** has been sanctioned in connection with the administration of the sanitary laws of England and Wales, outside the Metropolis. These figures will serve to convey not only an idea of the extent of the works that have been, and are, going on for sanitary purposes, but of the enormous increase that has taken place in such works during the last ten or twelve years. The larger proportion of these amounts, as may be expected, is for sewerage works and water supply, and upon these works alone the amount authorised to urban and rural authorities has averaged during the last five years over 1⅛th million a year. The total amount of sanctions for public health purposes authorised by the Local Government Board averages upwards of 2¼ millions a year, which sum includes, besides sewerage and water supply works, a variety of other matters, such as street improvements, markets, recreation

* Thirteenth Annual Report of Local Government Board pages lxxi., *et seq.*