SECTION I.

SANITARY SCIENCE AND PREVENTIVE MEDICINE

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THE President of the Section, Professor F. de Chaumont, F.R.S., delivered the following address:

Ladies and Gentlemen,—My first duty to-day is to offer you a friendly greeting on the opening of the Section of Sanitary Science and Preventive Medicine; my second to tender my sincere thanks to the Chairman and Council of this Institute for having placed me in this honourable position. I hope I shall be able to justify their selection, although I know well that in an assembly like this a President's duties are light, friendly co-operation and not obstruction being our rule, even on those points where we must agree to differ; for in sanitary matters, as in other things, there are differences of opinion, and unfortunately often very serious ones.

Opening addresses have often been objected to, or at least their use questioned, especially when time is necessarily limited. I am quite ready to admit that if an opening address be of inordinate length it is an evil, and that it takes up the time which ought to be devoted to the papers and discussions. On the other hand, if it be kept within reasonable limits, I think it is well to mark in some such way the opening of the Section, and the occasion may be usefully employed in several ways. As I am addressing a mixed audience, to some of whom at least the subject is probably new, it may not be unprofitable if I explain what we mean by preventive or public medicine. This I will now do as briefly as I can. The word 'medicine,' like the word 'religion,' has had more than one meaning in its time, and even in the present day confusion arises, particularly when it is employed in an unfamiliar way. To the savage, medicine is synonymous with witchcraft; to the civilised man it often presents merely the idea of a drug, or, if it be used by extension to embrace the profession, the giving of drugs appears to be the most important part of it. But drugs may to some extent be called the opprobrium of medicine, as the knife is of surgery. For the highest medicine is that which obviates

the use of drugs,—the highest surgery that which saves the limb, not that which lops it off. The Greek for a physician is *ἰατρός*, and this can be traced back to a primitive Aryan root 'yu,' which signifies 'to avert,' 'to ward off.' It is in this sense that we here employ the term 'medicine,' and public or preventive medicine is thus the science that wards off disease from the community. The expression 'state medicine' is also frequently used, meaning pretty much the same thing, and formerly the term 'medical police' was very commonly employed. Similar terms are or have been in use in most European languages. Attempts have sometimes been made to draw distinctions between those different phrases, but the necessity or utility of such refinements may well be doubted. It is well to recognise a general science of health preservation, which we may call sanitary science, or perhaps more conveniently hygiene, and of this there are several branches or divisions. Between those divisions no very hard and fast line can be drawn, although the differences are sufficiently defined for practical convenience. The arrangement of our Sections suggests one mode of division which is convenient. We devote one, the Section which meets here to-day, to public or preventive medicine, which may be looked upon as embracing for the most part the principles which are to guide us in our work. The second, which meets to-morrow, considers the questions of construction and engineering applicable to sanitary matters, and this may be looked upon as embracing the more important practical application of those principles. The third, finally, which meets on Friday, considers the questions of meteorology, geology, &c., those wider, and to us as yet vaguer influences, upon which, however, doubtless depend many things of the highest importance in connection with the health of man. Leaving to my learned colleagues, the Presidents of the other Sections, the task of commenting upon their own particular branches, we may turn our attention for a few minutes to our special Section. This, as I have said, is more especially connected with the principles of hygiene, or sanitary science; but it would be a grave mistake to suppose that it is only theory that we deal with. We have to go into many practical points as well, and especially to bear in mind that it is the practical application that makes principles important to humanity. A knowledge of what is good and true is of little use if our lives are false and our deeds are evil. The highest abstract conceptions of the beautiful are nothing if our work in the concrete breaks every law of form and harmony. We must insist upon our philosophy bearing fruit, as Bacon did with his, and if our tree does not bear fruit, it had better cease cumbering the ground. Sanitary questions, in one form or another, are of very old date, and

many of the earliest writings are occupied with rules and instructions as to how health is to be preserved and plagues are to be avoided. Advantage was taken in many cases of the superstition of the people, when the more enlightened rulers sought to enforce those rules and practices by giving them the sacredness of religious observances; in fact, making their discharge a *religion* or outward sign of the faith they professed. In matters of practical sanitation the ancients were in many things in advance of the moderns. The hygiene of both cities and camps was understood to a remarkable degree, whilst the habits of personal cleanliness, and the healthy outdoor lives most men led, no doubt greatly conduced to the well-being both of the individual and the community. Although we read of plagues and pestilences from time to time, it is not until we have passed the Christian era that we begin to encounter those appalling pestilences that so often struck terror into the heart of Europe, and made its wretched inhabitants think the end of the world was at hand. The fall of the Roman Empire was in a great measure the era of retrogression in a sanitary sense, although it may have had its advantages in other ways. It may shock the feelings of some, but it must be admitted that the progress of Christianity had an evil influence on the sanitation of the world. It so happened that both pagan and Jew were clean, and the Christian could think of no better way of testifying his opposition to both than by doing the reverse of what they did. Therefore the more fanatical ceased to wash either person, clothes, or dwelling, because pagan and Jew cleansed all three. Dirt became the odour of sanctity, as the hideous tales of St. Simeon Stylites and other unsavoury fanatics only too truly tell. The baleful influence of those misguided views continued to be felt through succeeding generations down to our own day, and it may be a question whether we do not owe some forms of malady at the present time to the effects of the accumulated filth of ages. Our learned friend, Dr. Richardson, has called attention to the remarkable immunity from epidemic disease enjoyed by the Jews, who have continued to practise those purifying observances handed down to them in the law of Moses. Let us hope, however, that if a sad recoil took place at the beginning of our era, it was one to be followed by a more vigorous bound forward in the time to come, according to the French proverb, *Reculer pour mieux sauter*, and that if we have not yet got rid of dirt altogether, we at least *know* that it is matter in the wrong place, and may set ourselves to place it rightly when opportunity presents itself.

I have said that the study of sanitary matters was a very old one, but I guarded myself from using the expression sanitary science, for

in truth the sanitation of former times was almost, indeed we may say altogether, empirical. It was through experience merely that effects and causes were rudely connected together, but anything like proper generalisation was wanting. It was as if it had been experimentally ascertained that an incandescent object would generally burn, and a man were to lay hold confidently of a bar of hot iron because it was not actually in a glow. The obstacle to progress lay in the imperfections of the sciences generally, which thus made anything like a scientific study of disease-causes an impossibility. Superstition of all kinds was also so much mingled with all inquiries that the collection and grouping of observations was an extremely difficult task. The question is, how far have we advanced out of this condition in the present time? Are we really entitled to speak of sanitary science or a science of hygiene? Have we emerged from the empirical epoch? I am afraid that we must admit that we have only very partially done so, and that to a large extent we have done little more than remove the supernatural from our list of causes. We are still very much in what Comte calls the 'metaphysical' stage of the question. It may seem a contradiction of terms that I should in one breath speak of the question as 'empirical,' and in the next 'metaphysical,' but it is really not so. 'Empirical' is 'experimental,' but not experimental in its best sense, and hence 'empiricism' has become synonymous with charlatanism. It is at best working by experiment, but in an unintelligent way, either looking no further than the present fact, or else applying to the observed fact a crude and ill-digested generalisation. In this way empiricism, experimental though it be, is well calculated to lead to metaphysical views of things, meaning by that, views which tend to throw the efficient cause back into transcendental operations, which merely form a cloak for pretentious ignorance. In saying this I have no particular views or theories in my mind that I propose to gird at; *mutatis mutandis*, the same principle might be applied to all the sides of the question. But how, then, are we to have a real science of preventive, public or state medicine? Is such a thing possible, or is it merely a fond dream? If we look at the opposite opinions held and theories urged by men of long experience and knowledge, it must be confessed that there is some reason for discouragement. Sanitary science can only advance as medical science proper advances, and by medical science we mean especially diagnosis, pathology, and etiology: that is, the correct recognition of disease; its history and description as revealed by researches both in life and after death; and lastly its causes, proximate or remote. In the two first branches the forward progress has been

in modern times extremely rapid, and in many directions highly satisfactory. Of the last, the determination of the causes of disease, I am afraid I cannot speak with so much confidence, although we have made some advance. But it is upon this very branch of the subject that the advance of sanitation towards the dignity of an exact science depends. Until we know more of the causation of disease, it is impossible to lay down rules for its prevention. But because progress is slow, are we to despair? Certainly not. The only way to effect progress is by careful observation and recording of facts, having full faith that the day will assuredly come when those facts will range themselves in proper order and reveal the hitherto unknown law that binds them together. But each fact must be the truth, so far as we can make it so, and its bearing must be measured and its value weighed. The word 'medicine,' from the Latin 'mederi,' is traceable to an Aryan root 'mêdh,' or 'mêd,' which means 'to know'—'to understand;' that is, not merely to be a storehouse or lumber-room of isolated facts, but to be, if possible, a properly classified museum, in which each is arranged according to its correct natural affinities. Curiously enough, etymology carries us still farther back into the morning of our race, and shows us that the root 'mêdh' was connected in a far earlier time with the root 'madh,' to measure—a root which we find in *mathematics*, *moderation*, and in *measure* itself. It would seem that those two roots became early separated, just as medicine and the science of measurement, or mathematical precision, have been so long divorced. It is the province of our age to bring about a reunion of those two, which have been too long estranged. The more the science of measurement, in its widest sense, has been applied to biological inquiries, the more it has been seen that all nature is obedient to fixed laws, and we need have no fear that that part of biology which has to do with the causation of disease is in any way an exception. The Greek myth which made the Goddess of Health the daughter of Esculapius, the typical physician of the heroic age, contained a germ of truth which could be appreciated only in later times. Another story makes hygiene or health an attribute of Minerva, indicating that upon wisdom or knowledge all health depends. Let us hope that in this case wisdom may be justified of her children.

F. DE CHAUMONT, M.D., F.R.S.

President of Section.

On the conclusion of Professor De CHAUMONT's address, Lord FORTESCUE proposed a vote of thanks to the President of the Section for his lucid and interesting remarks.

Dr. Carpenter (Croydon) said he had very great pleasure in seconding the vote of thanks proposed by Lord Fortescue. The address showed deep thought, and he trusted that the subject matter of it would sink deep into the hearts of those who heard it, for it would lead them to believe that there was a future in connection with sanitary science that would bring its own reward, and that the city of Exeter might receive some benefit from what was now taking place in its midst. He was sure the address would be a marked one in the history of the Congress and the Institute.

The vote was carried *nem. con.*, and was acknowledged by the President.

Exeter Sanatorium, with a Few Remarks on the Importance of Early Isolation of Cases of Zymotic Disease.

Exeter having been one of the earliest towns to provide a hospital for the reception of cases of infectious disease, I have thought a few remarks on the subject, with a short account of the Sanatorium and the patients treated there, might not be unacceptable to you on this the first occasion of the Sanitary Institute holding its Congress in the 'ever faithful city.'

The Town Council of Exeter became the Urban Sanitary Authority by accepting the Local Government Act in 1867. But, previous to this, on the approach of the cholera epidemic of 1866, they appointed an Inspector of Nuisances (Mr. Stear) and formed sub-committees, who made a house-to-house visitation; and in conjunction with the district medical officers, considerable sanitary improvements were carried out. House drains were examined and repaired; privies changed into water-closets; cesspools closed; new water-closets compelled to be erected, where required, with proper connection with the town sewers; water-cisterns were cleansed and numerous new cisterns ordered, at a considerable cost to owners of small houses.

The guardians of the poor engaged extra medical men to act as assistants during this epidemic, which, although severely felt in Exeter, would undoubtedly have been far more fatal had these steps not been taken. At this time, the first attempt at providing a separate place for the reception of cases of infectious disease was made by the removal of a few cases, occurring in common lodging-houses, to the workhouse, where a couple of rooms, isolated from the house, were used for this purpose. The cholera passed away, and with it a good deal of the sanitary activity. But in 1871, when an attack of small-pox threatened the city, the Town Council determined to build a small-pox hospital, or, as they, I think wisely, called it, a Sanatorium; and after some considerable difficulty, owing to the unwillingness of owners to sell land for this purpose, they secured a very eligible site—a field of an acre and a quarter, with a small cottage, in the parish of Pinhoe, close to the hamlet of Whipton, on the top of a hill, and only a mile and a half from Exeter.

Here they built (of necessity hastily) a wooden building, with four wards—two 24 ft. square, and two 20 ft. by 24 ft.—with a nurse's room between, whilst a covered way joined it to the cottage, in which cooking, washing, etc., were done; the hospital being capable of accommodating twenty-eight to thirty patients, and being heated by Gurney's stoves.

It was opened on November 2, 1871, and during that year and 1872 and 1873, seventy-nine small-pox patients were admitted, viz.:—

		Recovered	Died
Vaccinated	62	60	2
Not vaccinated . . .	17	12	5
Totals . . .	79	72	7

In 1873, 1874, and 1876 (there were no patients in 1875) a few cases of typhoid fever were admitted, viz.:—

		Recovered	Died
Typhoid fever	28	22	6

But up to 1877 the building had been considered as a small-pox hospital, to be used, perhaps, occasionally as a fever hospital for cases that could not be treated in their own houses, but not as an institution to which all cases that could not be properly isolated in their own homes should be taken, so as to stamp out, if possible, zymotic diseases at their commencement.

Unfortunately for the immediate success of this principle, scarlet fever had spread itself very considerably before it was adopted, as will be seen by the admissions in 1877, which were:—

		Recovered	Deaths
Scarlet fever	80	74	6
Typhoid fever	14	13	1
Totals . . .	94	87	7

Early in January 1878 small-pox in a very severe form was brought to the city from London by some young women engaged in the Christmas pantomime. But by promptly removing the cases to the Sanatorium, and thoroughly disinfecting the rooms, burning or disinfecting clothes, bedding, &c., and revaccinating all persons who had come in contact with them, the disease was soon eradicated. The number admitted in January was—

		Recovered	Deaths
Vaccinated	7	7	—
Unvaccinated	5	2	3
Patients who caught the disease whilst in the Sanatorium (vaccinated)	5	5	—
Totals . . .	17	14	3

At this time there were several cases of scarlet fever in the building; and although the small-pox patients were placed at the other end, and those convalescent revaccinated, yet, owing, I conclude, to the partitions not having been carried quite up to the top of the roof, five patients caught the small-pox. All, I believe, had been vaccinated in infancy, and none had the complaint severely, or were at all marked by it.

This occurrence, however, called attention to a defect in the building, which had been hastily run up for a small-pox hospital only. The wooden walls were battened, and the space between filled in with sawdust, the partition carried up to the roof, and the wards entirely separated from each other.

But not content with this, the Town Council have built an entirely new permanent brick and stone building, consisting of two large wards, each to contain eight beds, with baths (hot and cold), nurses' rooms, etc. This is quite detached from the old building, and will be used when required—*i.e.* if we should have cases of two separate diseases. Some difficulty has been found with regard to water supply, but that has been met by large rain-water tanks for washing purposes, and a deep well (151 ft.) for drinking water. Earth-closets are used, and excreta, etc., are buried. The usual out-buildings are provided. I need not weary you by further details of cases, which are all given in a schedule appended; but I may state that now every case of small-pox, typhoid or scarlet fever occurring in the city which from any circumstance cannot be properly and thoroughly isolated where it is, is, on the order of the district medical officer of health, at once removed to the Sanatorium.

There is a nurse (Mrs. Manley) who resides at the cottage annexed, and extra nurses are engaged as required; whilst the medical attendance is undertaken by my colleagues, Messrs. Bell, Brash, and Harris, and myself, each of us taking it in turns to attend monthly.

The Sanatorium has now been open just nine years, and during that time the number of admissions has been:—

			Recovered	Deaths
Small-pox	Vaccinated	74	72	2
	Unvaccinated	22	14	8
		96	86	10
Scarlet fever		97	91	6
Typhoid fever		108	93	15
Measles		9	9	—
		310	279	31

This result may be considered highly satisfactory, 310 cases with only 31 deaths or 10 per cent. being, I believe, much below the average. The sanitary inspector (Mr. London) is provided by the Town Council with a roomy carriage (formerly a cab), which has a board and cushion fitted across one half of it, so that children can be laid quite down, and adults nearly so, in transit. This is disinfected after being used, and it can be obtained by any one requiring it on application to the sanitary inspector. An ambulance carriage has been thought of; but, at present, there is this objection—in removing all cases it is important to do so quietly and without calling particular attention to the fact, whereas a distinctive carriage being seen in the street would excite remark, and lead, if not to a panic, at least to an exaggerated report of the number of cases removed to the fever hospital. At first we had some difficulty in persuading people to let their relatives be removed, and as it was out of the city it was not until the Exeter Town Council got (in 1875) an amending clause inserted in the Act giving compulsory powers to send not only to a hospital within their jurisdiction, "*but within a reasonable distance*," that we could legally compel the removal. This has, I am glad to say, seldom been required, as year by year the patients appear to value more and more the healthy situation, the fresh air, and the care with which they are treated. The advantages of compulsion, etc., were never better shown than in the case of a laundress (in S. Sidwell's parish) who was ironing clothes in the room in which one child was running about in the skin-peeling stage of scarlet fever, whilst another was lying on two chairs covered with the rash, clothes drying hanging all around him. The mother denied that they had the scarlet fever, and refused to let the children be removed. The magistrates, however, ordered the immediate compulsory removal of the children and the thorough disinfection of all the clothes. It is fearful to think of, what mischief this might have caused had the case not been discovered when it was, as in the ordinary course the clothes would have the same evening been distributed all over the city. In alluding to the effectual stamping out of small-pox in January 1878 (since which date no cases have occurred in Exeter), it is only fair to the public vaccinator (C. H. Roper, Esq.) and the vaccination officer (Mr. C. Ashford) to call attention to the efficient way in which the vaccination of infants is performed in this city; whilst it is chiefly owing to the trouble taken by the district medical officers of Exeter (Messrs. C. E. Bell, E. A. Brash, and J. D. Harris) that cases of infectious disease are discovered *at their commencement* and removed to the Sanatorium. Knowing that one fact is worth a hundred assertions, I hope these few particulars may induce many other towns and districts to follow our example and establish hospitals for infectious diseases. It cannot be too much impressed on the public that all zymotic diseases *are, or ought to be, preventable*. This is generally allowed with regard to scarlet or typhoid fevers, but it is not equally known that measles and hooping cough are not *necessary* diseases *which every child must have*, or we should not find mothers and nurses taking children to catch measles, because "*this is such a good sort.*" With regard to elementary schools, I believe they are a source of the spread of these diseases more often than is suspected. Instead of the teacher making due inquiries as to the cause of absence from school from illness, and if found to be of an infectious character not allowing the brothers and sisters to attend the school for a time, too often, in order to keep up the average attendance, or to swell the number at the examination and so increase the grant, children are allowed to come daily from houses where some are suffering from these diseases, which thus be-

come spread far and wide through the town. It is but fair to state that in some schools a very different mode is adopted, and all that can be done is done to prevent any infected children coming to the school.

CASES TREATED IN EXETER SANATORIUM

From Nov. 2, 1871, to Sept. 22, 1880

Date	Small-pox			Scarlet fever	Typhoid fever	Measles	Recovered	Deaths	Remaining at end of each year
	Total number	Vaccinated	Not vaccinated						
1871	11	10	4	...	...	...	9	1 (n v)	4
1872	24	20	4	...	...	...	4 22	2 (1 n v)	...
1873	41	32	9	...	...	...	37	1 (3 n v)	...
,,	...	...	...	...	7	...	6	...	1
1874	...	...	...	...	13	...	1 10	3	...
1875	...	...	...	...	...	...	...	...	...
1876	...	...	...	...	8	...	3	3	2
1877	...	...	...	...	...	...	1 (T)	1 (T)	...
,,	...	...	...	80	...	...	61	6	13
,,	...	...	...	...	11	...	12	1	1
1878	...	...	...	...	...	...	13 (S) 1 (T)	...	...
,,	...	...	...	...	25	...	23	2	...
,,	...	...	...	15	...	...	14	...	1
,,	12	7	5	...	...	...	9	3 (n v)	...
,,	5*	5*	...	...	...	...	5	...	...
1879	...	...	...	...	...	...	1 (S)	...	...
,,	...	...	...	2	...	...	2	...	...
,,	...	...	...	...	29	...	19	4	6
,,	...	...	...	...	...	2	2	...	...
1880	...	...	...	...	...	...	6 (T)	...	...
,,	...	...	...	...	12	...	11	1	
,,	...	...	...	...	...	7	7	...	...
	96	74	22	97	108	9	279	31	

* These five patients were admitted with scarlet fever, and caught small-pox in the Sanatorium.

ANALYSIS.

Total number of patients 310, including 5 counted twice, who had scarlet fever and then small-pox.

		Recovered	Deaths	Total treated
Small pox { vaccinated	74	72	2	96
Small pox { not vaccinated	22	14	8	
Scarlet fever	97	91	6	97
Typhoid fever	108	93	15	108
Measles	9	9	...	9
	310	279	31	310

Because I have not in this short paper alluded to drainage, water supply, etc., it must not be imagined that I do not appreciate their value; but whilst too much importance cannot be put on having pure air and pure water, still, as with the present facilities of locomotion it is impossible to prevent the introduction of infectious diseases, it is to isolation we must principally look to check and stamp out zymotic disease when it *first* shows itself, and this, I believe, it is impossible to do without—

First, a proper hospital or building being provided by the sanitary authorities; and secondly, a compulsory notification of each case of infectious disease. The onus of this should rest on the parent or householder, and *not on the medical attendant.*

The plan I would propose is that each householder, etc., should be bound under a penalty to inform (within so many hours) the local sanitary authority of any case of infectious disease occurring in his house, and I would further oblige (also under a penalty) the medical attendant to inform the friends of the patient as early as possible that he was suffering under an infectious disease, giving name, etc.

In each district the name of the person to whom notice should be given, with a list of the diseases to be reported, should be freely posted, all communications to be strictly confidential, and, if desired, visits, at first at least, to be paid after dusk, or report to be accompanied with a certificate from the medical attendant stating that proper isolation and disinfection are being efficiently carried out.

JOHN WOODMAN, F.R.C.S. (*by Exam.*),
Medical Officer of Health, City and County of City of Exeter.

Mr. HENRY C. BURDETT said that the people of this country did not like too much motherly legislation; but it was unquestionable that legislation should compel people to do their duty towards their neighbours in sanitary matters, for the spread of fatal diseases was too often owing to the neglect of sanitary precautions. The best way to educate the public in health questions would be by insisting upon health laws being carried out, and this insistance would keep before the minds of the people the duty which all members of society owed to each other. One necessary though lacking piece of legislation was that compelling the notification of cases of infectious disease, for the registration of diseases would be a great check to infection. The onus of this notification should be thrown upon the householder. True legislation was based on the greatest good of the greatest number, and the effective registration and the reporting of infectious diseases should be made compulsory by law, upon every householder, of whatever rank or position. It was part of the scheme of the Home Hospitals Association in London to provide cottage hospitals for infectious diseases—hospitals in which the patients would be attended by their own medical men. To show that medical men recognised the importance of isolation in such cases, he might mention that a medical officer of Guy's Hospital had had his own wife removed to an infectious hospital in a case of fever. The hospitals of the cottage character could be maintained by subscribers, the subscribers having the first opportunities

of using the institutions in case of necessity. The Sanitary Institute must be indebted to Mr. Woodman for having brought out instances of the advantage of isolation in the treatment of infectious disease.

Dr. Bond (Gloucester) had found in his own experience that one of the stock objections to the erection of such hospitals as that just described by Mr. Woodman was, that you may provide the hospital but you cannot get the people to go into it. At Cirencester there was a hospital, with ten beds, provided by Cirencester and Gloucester in conjunction. As a matter of fact, it had been made very considerable use of, but a large proportion of the patients were children; indeed, the children were made so thoroughly comfortable that they were really unwilling to leave. There was no foundation whatever for the very prevalent prejudice which asserted itself, and caused in some cases a disinclination to go into these hospitals.

Mr. Domville pleaded the local character of the paper and its interest to Exonians as his excuse for intruding upon the section in order to take exception to one or two so-called truisms. He congratulated Mr. Woodman that he had signed his paper as 'Medical Officer of Health for the City and County of the City of Exeter;' and he trusted that this would go forth as a fact, and not as a theory, for in the Exeter Town Council the other day, on asking if a certain matter had been referred to the Medical Officer of Health, he was met by the assertion that there was no Medical Officer of Health for the city, and that it was hoped that the city would never be under one. A Medical Officer of Health would be more efficient if he were untrammelled by the necessities of his private practice. It was absolutely necessary that there should be a Medical Officer of Health for a city like Exeter, with the entire services of an efficient man, and this point had a much wider bearing than they were at first willing to admit. The present medical arrangements at the Sanatorium were unsatisfactory. The advantages of the Sanatorium would be increased twenty-fold if it were removed from the charge of three or four medical men in practice in the city, handed over to one man who was not a competitor in practice, and freely opened to all medical men, who would thus be able to induce patients of the higher classes to go there, on the assurance that they would not have to be attended by a practitioner other than their own medical man. Then, too, he had to remark, that schools, in these days of examination, were not only hotbeds of infection, but in too many cases the pressure brought to bear to compel children to attend the examinations was productive of immense evil. It should be the bounden duty of the teachers in such cases not to compel the attendance of children in the schools, but absolutely to prohibit it. He mentioned, without disrespect to the Medical Officer of Health, that in Exeter it had been stated that the Inspector was the more competent to pass an opinion whether the children should attend. Then it was necessary there should be a proper ambulance provided. At the same time there was a strong opposition to the use of any distinctive vehicle—one which savoured of the prison van. If members of the Congress could help to the designing of an unrepulsive pattern vehicle, in which the patient could lie recumbent, they would enable the medical men of the city to carry out the principles of the public health.

Mr. Robins inquired whether 'Sanatorium' was to be the name of fever hospitals or convalescent hospitals?

Dr. Carpenter congratulated Mr. Woodman on the fact that the Sanitary Authority had the control of the Sanatorium and not the destitution authorities—the guardians. Where the isolation of the sick had been done under the latter authority, it had frequently been very injurious to the suppression of disease, because people would not go into the buildings supervised by Boards of Guardians, under the impression that they were thus being pauperised. By stamping out disease in the first instance, its development in private houses would be prevented. The Sanitary Institute was anxious to impress upon the people that there were sanatoriums and sanatoriums, vaccinators and vaccinators. If vaccination were properly performed, there was no doubt that the number of cases of small-pox arising in the district in consequence of exposure would be proportionately small. Vaccination was performed much more efficiently now than it was twenty years ago, and it would be found, on an examination of small-pox patients, that the children who had been vaccinated were absent. Mr. Domville had impressed on the meeting the necessity of Medical Officers of Health being untrammelled by private practice; and this might be said without disrespect to Mr. Woodman, if the large city of Exeter could see its way to such an appointment, as it was human nature that other medical men would not be anxious to get Mr. Woodman introduced into families which they were attending. The course suggested by Mr. Domville would, therefore, be advantageous to the community. The speaker trusted that the people would not be slow to take advantage of this sanatorium, the existence of which rendered aid to those whose duty it was to stamp out disease.

Mr. Stephen Bourne remarked that the difficulty with respect to schools might be got over by the aid of the Education Department, if the days when the children were unable to attend in consequence of sickness were reckoned in the days requisite to qualify the children for presentation for examination. The qualification was merely for presentation, and did not carry with it any results unless the child was able, by intelligence, to achieve them. A proper representation to Mr. Mundella would doubtless effect an alteration in the code of regulations.

Dr. Richardson suggested that Mr. Bourne should draw up a resolution for consideration at the Council Meeting on Friday.

Mr. White stated that he had just pencilled out a resolution, and promised he would subsequently submit it. He referred to a small Cottage Hospital in Hampshire, in which the rule was that one medical man should supervise it, but that each patient, coming from all the villages around, should select his own medical man. This rule had been one great means of inducing the people in the neighbourhood to come into the hospital, because they would not be restricted to the attendance of one medical man.

Mr. Woodman, in reply, said that, as one of the Medical Officers of Health, it was not for him to say whether his position was good or

bad. The Exeter Hospital was generally called the 'Sanitarium,' but was more frequently spelled the Sanatorium. If it had been in the first instance called the Fever Hospital, or a Small-pox Hospital, they would not have got the patients to go there. In 1880 there had not been a single case of scarlet fever received into the Sanatorium, and he believed that there had been only one isolated case in the whole city. It showed that the Sanatorium had been a step in the right direction. A very large number of the modern cases of small-pox showed marks of very imperfect vaccination; and, as far as death prevention went, vaccination had proved very successful, and when cases had occurred, they had been of a mild character.

The PRESIDENT concurred with Mr. Domville, and added that a Medical Officer should be so far independent of the authorities that he could not be removed at caprice. Referring to the use of the term Sanatorium, Houses of Recovery, &c., he pointed out that until the public had become more enlightened, these little subterfuges would have to be resorted to. On the subject of registration, he mentioned that last year, at Amsterdam, he had seen the course adopted in Holland. The inhabitant householder, as well as the medical man, had to give notice of the occurrence of infectious disease; and, if there were not means of isolation, the patient was sent to the public hospital. If there were any objection to that course, the house was put into quarantine, and placarded, 'This is an infected house,' with the nature of the disease; and no business was allowed to be carried on in the house where infection existed. Holland was not a despotic country, but with parliamentary legislation and freedom like England. In England, therefore, there ought not to be any practical difficulty in the adoption of a similar course, without which we should never satisfactorily be able to cope with infectious diseases.

Notes on the Spread of Diphtheria.

THE prevalence of Diphtheria, ever since the beginning of the sixteenth century, in every region of the old and new world—its large proportional fatality, its probable recurrence in the same individual, the hereditary susceptibility to its attacks, the rapidity with which it often strikes down its younger victims—the hidden pathways along which it glides from one home to another, passing by the hovel where sanitary neglect seems to claim it as an expected guest, and knocking with a hand which admits of no denial at the cleanest upland homestead—fix the attention of the student of preventive medicine, and render its etiology a matter of no slight interest.

The noble Washington, the historical Empress Josephine, our own well-loved Princess Alice, are counted among the numbers it has slain.

That one sick child may infect an entire household; that its poison may be smuggled in clothing; may be meted out by our milkman in his daily rounds; may steal on us shrouded in the gases of our sewers; that it may cling to the floors and walls of empty chambers for days or even weeks—are but too well recognised facts. Indeed, I remember where within one of my sanitary districts the farewell kiss impressed on a coffined corpse proved the kiss of death to a group of unsuspecting Sunday-school children.

Neither the season of the year, nor excess or deficiency of heat, bear any relation to the spread of Diphtheria, and its connection with rainfall is assumed rather than proved. If we extend our inquiry into the propagation of Diphtheria over any wide area, we shall soon observe that the majority of those suffering from its attacks are children, and that the most impure and over-crowded habitations quite as often escape as the cleanest and best ventilated; in fact, that it is not on sanitary conditions that, at all events, its primary visitation depends. No doubt that when Diphtheria is once fairly established among a swarm of ill-fed, close-packed, unwashed youngsters, they will die faster and spread infection further, than more fortunate children; but these are only the accidents which result from overcrowding, want of control, bad nursing, and all the attendant ills of thriftless poverty.

But the isolated position of a house, and its distance from an infected centre, render it no more secure from the advent of Diphtheria, than the cleanness of its surroundings might be expected to do. This disease leaps with long strides from one dwelling to another, miles apart, leaving the inhabitants of the intervening hamlets and cottages untouched. The only reasonable explanation seems to be that the atmosphere becomes contaminated by contagia from the bodies of the sick, and that currents of air carry the poison with them in their course. Bretonneau, indeed, opposes to this theory the weight of his great authority, for he says, 'it (Diphtheria) no more possesses this property than the syphilitic disease does.' And in another place, 'The facts supplied by the epidemics of diphtheria which have broken out in the department of Indre et Loire, or which have extended into the surrounding departments, prove in the most evident manner that the atmosphere cannot transmit the contagion of Diphtheria.'

William Squire, however, admits that, to some extent, the material of infection must be diffusible in the air, and that within the limits of a house the danger of infection is greater from this source than from direct contagion.

I venture to think that he understates the facts, and that the miasm of Diphtheria travels far along the course of prevailing winds. I relate the following as an illustrative case:—

On the morning of June 6, 1879, the household of a farmer living at Warnscombe Farm, North Devon, were in perfect health. Their milk supply was derived from their own healthy cows; their drinking water was excellent; they used neither drains nor cesspits, simply a detached earth closet. The building stands more than a mile from any other, on the sloping side of a grassy hill, commanding delicious land and sea views, and is blown on by every wind except the north-east. Three of the children were absent from home for a few hours on this day, walking a distance of a mile or so towards the sea-

board, and returning home direct—neither entering a dwelling-house nor conversing with strangers. At nightfall, two of them complained of illness. The next morning Diphtheria was recognised by their medical adviser, and on the fourth day the youngest, aged seven years, died. The illness was made known to the local sanitary authority from the commencement; and, in conjunction with the medical man in attendance, the most stringent precautions were used to limit the spread of infection—providentially with good success. I instituted a most searching inquiry, both within my own sanitary districts which surround the house and in the adjoining parishes, to discover a source of infection, and could find none nearer than in a village eight miles away, where, in a detached house, two cases of Diphtheria had occurred not long before. The tenant of Warnscombe, a most intelligent yeoman, who took the greatest interest in the matter, assured me that there could have been no possible intercommunication.

The behaviour of Diphtheria during an epidemic which occurred at Ilfracombe in 1873-4 affords a further illustration of its aërial spread. Certainly for ten years previously, and probably for a much longer period, no case had been noted in the town or district, when, on April 21, 1873, the death of a child aged 4 years was registered as 'Diphtheria, membranous exudation on the fauces,' thus leaving no doubt of the nature of its illness. The house in which the child died is a small hotel, a few feet above the sea-level, situated in a very sheltered position, adjoining the poorest and most crowded part of the town. No special sanitary precautions were used except the separation of other children and the rest of the household from the sick child. The windows of the room in which it lay were closed, certainly through no theory of air infection—and ventilation was carried on by means of the upcast draught of a wide open fire-grate. The corpse was early placed in a secure coffin and buried. More than six months passed by, and no fresh case occurred.

In the following November there were some cases of Diphtheria on board a training-ship in a distant port, and a lad named Prust, aged 13 years, was sent home ill to Ilfracombe. He was received by his aunt, housekeeper to an elderly lady, who resided in a large roomy house, part of a terrace overlooking the town some two hundred feet above the sea level, and open to the fields front and rear. A medical man, who chanced to live next door, was called to see the boy an hour or two after he came home, and recognised Diphtheria. On the third day the lad died. His aunt,—'to avoid making a fuss,' as she called it, and dreading her mistress's displeasure on her return home—neglected every sanitary duty, aired the sick chamber with open windows, and removed the corpse on the evening of death to a relative's house, in a hastily-constructed shell.

This house was unfortunately nearly the highest in the town. Twenty-four hours had hardly passed before two of its inmates, young children, were infected. They were carefully kept within doors, and all communication with the outside world prevented so far as might be.

Four days afterwards, three children, aged 4, 5, and 8 years, living half a mile west, straight down the course of the then prevailing wind, were fatally attacked with Diphtheria. The same medical man

was not in attendance on them; the milk supply was separate; and their isolation was satisfactorily proved, as they were just recovering from measles, and had not quitted their own roof for the previous three weeks, except to take an airing in the garden. In fact, the medical certificate of death in the case of the first child is 'Measles—Diphtheria.'

In a day or two more, the children of a country wheelwright were attacked, three fatally, with the same disorder. His house is two miles from the town; is isolated on the top of a blowy hill (700 ft. high) surrounded with upland pastures, sloping down to the coast-line. During a portion at least of the preceding week the wind had blown in the direct line from the home of the last group of cases over this man's house. Two of his children, aged 2 and 4 years, were out of doors, well enough, in the daytime, and were attacked in the evening with hoarseness, pain in swallowing, swelling of the throat and palate, 'primary laryngeal Diphtheria,' and died within a few hours of each other.

From these multiplied centres of infection the disease spread. To check all communication from house to house was impossible, and by the time this outbreak had ended, more than 125 cases had been under treatment, and thirty-two children had died.

Now in the case which occurred in April 1873, it is true that no great attention was given to sanitary and preventive measures, and I am informed that the only antiseptic treatment adopted was the local use of potassium permanganate; still, from the *low level* of the dwelling-house, its very sheltered position, the almost accidental closure of the windows, and the early sepulture of the body, the germs of the disease could not mingle, to any great extent at least, with the currents of the air, and the poison failed to spread.

But no sooner had diphtheria been imported into a house *on a high, exposed situation*, and the corpse been carelessly moved from place to place, than clouds of disease germs were set free into the air; were driven down the wind, and soon found their way on to the mucous surfaces of children.

It will be observed that in the three examples of supposed aërial infection separate groups of children were attacked together, group by group, and that at least in two instances local lesions were first noticed, and were prominent till death took place. In fact, the relatives described the children's illness by using the expression 'that they were suddenly struck down with croup in the throat.'

On April 15, 1878, a sporadic case of diphtheria again made its appearance in Ilfracombe. It occurred in a very sheltered situation, some 90 feet above sea-level. Warned by the consequences of the preceding outbreak, early information was given to the local sanitary authority. From the very first day the sputa, the excreta, the linen, the throat were in various degrees all carefully disinfected. Some attempt was made to disinfect the air of the sick room. The attendants employed either hydrogen peroxide or potassium permanganate to their own hands and throats, and directly the child died she was enveloped in cotton wadding soaked in carbolic acid. The windows were kept closed, and ventilation was carried on by an open

chimney and large fire. The infection extended only to the next row of houses, causing, in all, but three cases and two deaths.

I have now before me a diagram, which I prepared in 1874, showing the distribution of diphtheria in the Ilfracombe district during this epidemic of 1873 and 1874. It takes the form of a sketch map, and furnishes, among other particulars, the height above the sea line of the houses where this disease prevailed. Reference to it shows that out of thirty-two deaths, twenty-six occurred in houses on high levels. There is no exact record of the distribution of non-fatal cases, but in a report which was made at the close of the outbreak I find I used these words: 'The residences of nearly all the sufferers are on high levels;' and a medical friend remarked, 'I do not recollect having attended a true case of diphtheria below the level of the south side of the High Street of Ilfracombe.'

In the year 1873 Ilfracombe contained a population of 5,000 souls—some 3,000, in round numbers, living on the lower levels, and the remainder in elevated situations, corresponding to the ecclesiastical divisions of the parish. Yet, though the population then preponderated so much on the *lower* levels, and the houses were so much closer packed and by far the oldest, they were comparatively free from the epidemic which hung round *higher built* houses. Neither milk, water, nor drainage cast any light on the cause.

The author of the 'Dictionary of Hygiene'[1] speaks of the same epidemic as extending into the districts of which he then was the health officer, and observes, 'The fact of its preference for high, open, and airy situations was extremely marked, the places of selection being isolated houses on lofty hills. It was propagated also into houses where there were certainly no insanitary conditions whatever.'

Observations made during a single epidemic, however carefully recorded, are far too limited to prove that air is a carrier of the material of diphtheria poison, be its nature what it may. There may be better explanations of the phenomena I have described. The problem to be solved is this—Is diphtheria a disease generated *de novo* in healthy children, under certain circumstances, of which we are entirely ignorant, or is it only communicated by contagion and infection in the widest use of these terms?

And if this doctrine of communication be, as it most probably is, the true one, is air one of the communicating channels; and, if so, under what special circumstances?

Of the transporting power of air, we have the well-known illustration of sails of ships, 800 miles away from the African coast, being red with minute particles of sand, which lodge on them after a sand-storm on that continent. Some ingenious experiments of Dr. Blackley[2] may further explain the initial appearance of diphtheria on high levels, and its wider spread from such places. Blackley not only estimated the amount of pollen dust floating in the air, by exposing slips of glass moistened with a mixture of proof spirit water, glycerine, and carbolic acid, but he also determined the amount of

[1] *Dict. of Hygiène*, art. 'Diphtheria,' p. 186, 1st. ed.
[2] *Hay Fever, or Hay Asthma*. By C. H. Blackley. London. 1873.

pollen at different altitudes, by flying kites, to which prepared slips of glass were attached, and by these means has ascertained the interesting fact that there is more pollen in the upper than in the lower strata of air. In one experiment a breeze had been blowing for twelve hours from the sea, and a kite with a glass attached to it was elevated to the height of 1,000 feet, a similar glass being exposed at sea-level. After three hours' exposure, the kite glass showed eighty pollen grains, the one at the lower level not more than one or two.

The local condition of the atmosphere may have much to do with the vitality and perfection of diphtheria organisms, as well as their distribution, as in the case of the potato blight (*peronospora infestans*), whose ordinary aërial fructification depends for its perfection on fractional differences in the proportion of carbonic acid in the atmosphere, and the presence or absence of the sun's light-giving rays.

With three if not four forms of infectious fever are associated the presence in the tissues of abnormal forms of vegetation, which, first discovered by continental pathologists, are confirmed by the conscientious experiments of Dr. Sanderson. Professor Cohn has proved them to be spirilla, of the class algæ or sea-weed.

In the case of diphtheria, Dr. Oertel, of Munich, considers the primary disease to be local, and Letzerich is confident that it is caused by a fungus which attacks mucous surfaces from the outside. Dr. Von Naegeli classes these microscopic organisms or micrococci in a group which he connects with fungi.

Now algæ will be more closely connected with the aqueous propagation of diseases, but every botanist will place the fungi as aërial in their fructification.

Thus air would be the natural agent for the diffusion of these fungoid microzymes or cacozymes, as Dr. Alfred Carpenter proposes to name them.

Is primary diphtheria a local or a constitutional disease? A large portion of its history is an attempt to solve this vexed question. If the theory of aërial propagation by cacozymes be true, local symptoms would first show themselves. The rapid progress of the disease renders the separation of local from general symptoms difficult, but the history of the cases I have recorded certainly favours a local view of infection, both from the incidence of the disease and the early attention which was attracted to the throat; and again, if a careful daily examination is made of those who nurse diphtheria patients, in a great number of cases patches will be noticed on the tonsils and adjacent surfaces. In the event of adult attendants, these patches generally pass away without further mischief, without treatment, and without even the knowledge of the person concerned.

To practical sanitarians the methods by which diphtheria can be propagated are questions of the greatest interest; and should multiplied cases be recorded where isolation seems certain, and yet the disease spreads—and, on the other hand, where air poisoning is obviated and the disease is checked—we may fairly consider that the atmosphere carries diphtheria in a way somewhat similar to the water-spreading agency in typhoid.

It may chance to be near the truth that diphtheria is an air-spread disease, and that the mucous surface of the throat and parts that lie adjacent are proper for the initial growth and fruiting of its special fungus; just as in the case of enteric fever, the mucous surfaces of the intestines are proper for the life of the typhoid fungus, which is water-born and water-spread.

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A Century of Death-Rates at Teignmouth.

A FEW years ago I introduced into one of my annual reports to the Teignmouth Local Board a calculation I had made of the death-rate in that town for each year from 1795 onwards. The result of these calculations induces me to reproduce them, with observations, in the paper which I now have the honour to read to you. I have, since that time, calculated the death-rate backwards to 1780, and forwards to 1879, and have added besides calculations of the zymotic death-rate and of the enteric fever death-rate, as well as the birth-rate, for each year since 1838, when the registration of births and deaths commenced. This table I now present to you (pp. 67 and 68).

It gives in the first column the date of the year; next the population as ascertained every ten years at the census, then the corrected population for each year; afterwards as far down as 1842 the number of burials in the town during each year, as ascertained by me from the registers in the churches and chapels, and the burial-rate calculated therefrom; then from 1838 onwards the number of deaths in the town registered during each year, and the death-rate calculated from them; and in the next column the mean death-rate for each period of ten years preceding each year. Afterwards come the zymotic death-rate and enteric fever death-rate for each year, and finally the number of births registered in each year, and the resulting birth-rate.

In calculating approximately the population for the years preceding 1801, when the census was first taken, I have been thus guided. In a very valuable manuscript describing the then condition of Teignmouth and its previous history, written by Mr. Robert Jordan, in 1791, and to which his grandson, Mr. W. R. H. Jordan, of Teignmouth, has kindly given me access, that gentleman gives the number of houses then existing in the town as about 400. Taking the conventional rule of five inmates for a house, this would give a population of 2,000 for the town at that period. The actual census ten years after giving 2,012 as its population then, this calculation is probably not far wrong. Again in 1690, on the occasion of the burning of Teignmouth by the French, the number of houses in East and West Teignmouth is given as about 300 On the same ground of calcula-

Table of Death Rates, &c., at Teignmouth.

Year	Population at Census	Corrected population for year	No. of Burials	Burial-rate per 1000	No. of Deaths	Death-rate per 1000	Burial and Death-rate per Decennial	Zymotic death-rate	Enteric fever death-rate	No. of Births	Birth-rate per 1000
1780		1945	38	19·5							
1781		1950	25	12·8							
1782		1955	22	11·2							
1783		1960	30	15·3							
1784		1965	34	17·3							
1785		1970	30	15·2							
1786		1975	33	16·7							
1787		1980	21	11·1							
1788		1985	28	14·1							
1789		1990	42	21·1			15·4				
1790		1995	29	14·6			14·9				
1791		2000	30	15 0			15·1				
1792		2000	39	19·5			16·0				
1793		2000	36	18·0			16·2				
1794		2000	25	12·5			15·8				
1795		2000	36	18 0			17·5				
1796		2005	30	14·9			15·9				
1797		2005	65	32·4			18·0				
1798		2005	22	10·9			17·7				
1799		2005	35	17·4			17·3				
1800		2005	38	18·9			17·7				
1801	2012	2012	36	17·8			18·0				
1802		2101	38	18·0			17·8				
1803		2190	37	16·8			17·7				
1804		2280	42	18·4			18·3				
1805		2369	35	14·7			18·0				
1806		2458	27	10·9			17·6				
1807		2517	51	20·0			16·4				
1808		2636	30	11·3			16·4				
1809		2715	36	13·2			16·0				
1810		2804	37	13·1			15·4				
1811	2893	2893	38	13·1			14·9				
1812		3001	54	17·9			14·9				
1813		3100	31	10·9			14·3				
1814		3217	31	9·6			13·4				
1815		3326	35	10·5			13·0				
1816		3135	50	14·5			13·4				
1817		3544	41	11·5			12·5				
1818		3654	60	16·4			13·0				
1819		3763	53	14·0			13·1				
1820		3872	49	12·6			13·1				
1821	3980	3980	61	15·3			13·3				
1822		4050	57	14·0			12·9				
1823		4120	70	16·9			13·5				
1824		4191	78	18·6			14·4				
1825		4262	74	17·3			15·1				
1826		4333	125	28·8			16·5				
1827		4404	76	17·2			17·1				
1828		4475	69	15·4			17·0				
1829		4546	105	23·0			17·9	8·8			
1830		4617	78	16·8			18·3				
1831	4688	4688	68	14·5			18·2				

Table of Death-Rates, &c. at Teignmouth—continued.

Year	Population at Census	Corrected population for year	No. of Burials	Burial-rate per 1000	No. of Deaths	Death-rate per 1000	Burial and Death-rate per Decennial	Zymotic Death-rate	Enteric fever death-rate	No. of Births	Birth-rate per 1000
1832		4666	58	12·4			18·0				
1833		4643	110	23·6			18·7				
1834		4620	97	20·9			18·9				
1835		4597	79	17·9			19·0				
1836		4574	59	12·9			17·1				
1837		4551	75	16·1			17·3				
1838		4528	76		74	16·3	17·1	0·8	0·11	93	20·1
1839		4505	68		75	16·6	16·7	1·9	0·88	108	23·9
1840		4482	77		73	16·2	16·7	0·6	0·00	106	23·6
1841	4459	4459	64		67	15·0	16·7	0·8	0·67	105	23·5
1842		4528	69		67	14·6	16·9	2·3	0·22	119	26·2
1843		4597			63	13·7	16·0	1·5	0·00	108	23·4
1844		4666			101	21·6	16·0	2·7	0·64	124	26·5
1845		4735			88	18·5	16·1	1·2	1·05	146	30·6
1846		4804			82	17·0	16·5	1·6	1·04	145	30·1
1847		4873			93	19·2	16·8	2·0	0·82	130	26·6
1848		4942			91	18·4	17·0	4·6	0·40	140	28·3
1849		5011			153	30·0	18·4	14·1	1·59	165	32·9
1850		5080			76	14·9	18·2	1·3	0·98	166	32·6
1851	5149	5149			97	18·8	18·6	1·7	1·16	152	29·5
1852		5236			111	21·0	19·3	2·2	1·52	177	33·8
1853		5323			85	15·9	19·5	1·5	0·18	148	27·7
1854		5410			171	20·0	19·3	2·4	0·37	179	33·0
1855		5497			105	19·1	19·1	1·3	0·18	111	26·2
1856		5584			91	16·2	19·3	3·5	0·35	163	29·2
1857		5671			100	17·6	19·1	2·1	1·05	176	31·0
1858		5759			155	26·9	20·0	7·8	1·39	167	29·0
1859		5847			125	21·3	19·1	4·2	0·31	177	30·2
1860		5935			98	16·5	19·3	2·0	0·50	188	31·6
1861	6022	6022			113	18·7	19·3	2·4	0·16	161	26·7
1862		6094			123	20·1	19·2	1·4	0·16	171	28·0
1863		6167			106	17·1	19·3	1·6	0·81	186	30·1
1864		6240			114	18·2	19·1	2·5	0·16	151	24·3
1865		6313			128	20·2	19·2	3·0	0·47	160	25·3
1866		6386			115	18·0	19·4	3·3	0·94	156	24·4
1867		6459			121	18·7	19·5	1·8	0·15	160	24·7
1868		6533			105	16·0	18·4	0·7	0·61	142	21·7
1869		6605			125	18·9	18·2	2·5	0·60	171	25·8
1870		6678			142	21·2	18·7	4·0	0·30	176	26·3
1871	6751	6751			113	16·7	18·5	2·9	1·33	156	23·1
1872		6823			107	15·6	18·0	1·7	0·29	187	27·4
1873		6895			133	19·2	18·2	2·1	0·43	178	25·8
1874		6967			147	21·1	18·5	2·8	0·28	169	24·2
1875		7027			116	16·5	18·2	1·4	0·42	173	24·6
1876		7087			96	13·5	17·7	0·5	0·00	179	25·4
1877		7147			107	14·9	17·3	0·7	0·14	176	24·6
1878		7207			129	17·9	17·5	2·9	0·97	197	27·3
1879		7267			121	16·5	17·3	1·5	0·41	172	23·6

tion this would give its population at that time as about 1,500. From these data I have made the calculations which appear in the table, and which may, I think, be taken as sufficiently accurate for the purpose.

Teignmouth is situated at the mouth of the estuary of the Teign, here more than a third of a mile in width, on its northern side, mainly on the slope of the hills rising from the river, which at a distance of two miles attain an elevation of 800 feet, but partly on a shingly flat thrown up at the direct entrance of the estuary into the sea. This flat portion was not built on till after the beginning of the present century. Through it passed in those days the estuary of a brook, the Tame rivulet, which divides the parishes of East and West Teignmouth, while the Comb or Bitta Brook runs to the west of the town into the estuary.

The soil of the district is of pure red sandstone conglomerate with a subsoil of clay at varying depths.

The employments of the inhabitants are and have been pretty equally divided between those connected with seafaring and fishing occupations, those connected with agriculture, and those attaching usually to the various wants of a town.

Previously to the year 1836, the water supply of the inhabitants was entirely obtained from the two brooks above mentioned, and wells connected with various houses.

The public sewerage was scanty, and of the most imperfect kind, the estuarial portion of the Tame brook, contracted and gradually covered over, becoming the main sewer of the town. The latrinal accommodations of the several houses were, when present, of the outside privy and cesspit class, to which water-closets were being by degrees added. In no small number of the poorer class of houses arrangements of this sort were, however, altogether wanting, the excreta finding their way directly or indirectly into garden ground, refuse heaps, or the tideway of the river, while the adult males resorted usually to the sea-shore, the fields, or lanes.

In 1836 an Act of Parliament was obtained, under which powers were conferred on a Board of Commissioners for constructing a reservoir, supplying the town with water (the water of good character being conveyed from the hill above the town), for providing public sewerage, for widening streets, for the watching and lighting of the town with gas, and for its general improvement. In 1859 the town placed itself under the Local Government Act, and a Local Board took the place of the Improvement Commissioners. Under these bodies the work of sanitary improvement has been carried out from those dates to the present time. A supply of good water has been provided, and has been carried throughout the town, and private wells have gradually been, with few exceptions, disused or stopped up. Streets have been widened, and new houses built in accordance with by-laws sanctioned by the Home Office. Drains have been laid in streets where before they were absent, and the Tame brook and other main sewers have been covered over and carried down to low water mark, the amount of 5,680*l.* having been expended by the town between 1850 and the present time, in works of sewerage alone. But what I wish to draw attention to in this paper is this, that with all these steps taken in the direction of sanitary progress, the death-rate was considerably and persistently higher after these works had been engaged in than it had been before, a fact rendered

more palpable in the column of death-rates for decennial periods. Thus the rates, which ranged between 12 and 14 per 1,000 in the decenniads ending with the years from 1813 to 1823, and from 16 to 17 in those ending between 1839 and 1848, ranged between 19 and 20 in those ending with the years from 1852 to 1867. From this date the rates have again decreased, and at present, it will be seen, they have declined to 17·3 per 1,000.

To what are these facts owing?

That sanitary improvements in a country or a town result, speaking generally, in diminished death-rates, is not a point at present open either to questioning or discussion. The proofs of it are ample and irresistible. It may be worth while, therefore, to inquire as to the probable causes of what at first sight seems so anomalous.

It may be said that a burial-rate cannot be compared with an actual death-rate. This to a certain extent is no doubt true, and requires to be allowed for; but as railway communication with Teignmouth did not exist before 1846, and as the means of transport in use before this were attended with a good deal of trouble and expense, it is possible that at the period when the burial-rates were the lowest they pretty nearly represented death-rates also. It will be observed, too, as to the four years from 1838 to 1841, in which both the number of deaths and that of burials are given, that these did not widely differ from each other, and also that the burial-rates before the early part of this present century were decidedly higher than in subsequent years, and more nearly resembled the death-rates that afterwards obtained.

I would look, therefore, for the explanation to another cause.

Teignmouth, during the last century, existed as a small sea-side fishing town and port, but at the close of the century, the time when Mr. Jordan wrote, it began to come into notice as a resort for visitors, and during the first thirty years of the present century it had become a watering-place of fashionable repute. This prosperity, the rise and development of Torquay, and the setting of the tide of fashion in that direction, materially diminished, and it will be seen that the population of Teignmouth, which had risen rapidly from 2,012 in 1801 to 4,688 in 1831, had declined in 1841 to 4,459. At the same time the population of Torre and Torquay, which in 1801 was only 838, in 1831 had risen to 3,582, was 5,982 in 1841, and in 1851 had reached 11,465. In 1846 the South Devon Railway was opened to Teignmouth, and its population began again to increase. In 1851 it stood at 5,149, in 1871 at 6,751, and is probably now about 7,250. We have here, then, within the last eighty years, two periods of increasing population in the town, the one attended by a low death-rate, the other by a higher one. What has made the difference? I believe this—that in the first of these two periods the increase in population was in that of the wealthier classes, both amongst visitors and residents, while owing to this, and to the Newfoundland trade then flourishing, there was a general absence of real poverty amongst the lower classes as well; whilst in the latter of these two periods the increase was—at first at least (and it ultimately became a permanent one)—in the poorer and the labouring classes of the community, and

those less stationary in their habits and possessing on the whole less of the conditions of physical comfort than their fellows of former days. It is to this preponderance of the poorer classes that I would ascribe the higher death-rates in the latter than in the former of these two periods. The last ten years have seen an increase again in the wealthier classes, amongst residents as well as visitors; but as the visitors increase the population principally during the summer and autumn months, while the census is taken in April, the death-rate of Teignmouth has always an extreme value, and is unmodified by the effect which the presence of the migratory part of its population at an opposite time of the year would produce.

If, then, the explanation I have proposed of the marked difference in the death-rate at these two periods of the town's history, and of their increase after sanitary works had been progressing, be correct, what are the causes of this preponderating death-rate in a poor as compared with a wealthier population? They are not, I fear, far to seek, and are too well known to all of us.

Briefly they may be described as greater exposure to cold and damp, to rapid changes of temperature, and to other hurtful meteorological influences; to greater liability to suffer from dangerous and unhealthy occupations; to insufficient clothing; to insufficient or unwholesome food; to neglect of cleanliness; to the presence of a more vitiated atmosphere in and around their dwellings; to greater ignorance of the laws of health; and to greater carelessness in the use of means to ward off or to get rid of disease.

This dependence of an increased number of deaths in a population upon the conditions above recorded is, I think, not unaptly illustrated by the record before you; but other lessons also are, it appears to me, to be learnt from it. The causes of mortality just mentioned may doubtless all be classed in a broad way under the head of insanitary conditions, at least of conditions inimical to health; yet many of them, it will be seen, are conditions of the people in their private and individual circumstances and habits, not of the locality in regard to its public economy. I would therefore submit that in studying death-rates for investigating the sanitary condition of a town or district at any particular time in comparison with that at another time, and much more in comparing by their aid the sanitary condition of one town with another, the relative proportions of the poorer and wealthier classes, and the nature of the occupations of the inhabitants, are material elements in the inquiry. I fear that not unfrequently a comparison between the death-rates alone of one town and another at a given time, or between those at two different periods of time in the same town, is too hastily taken as in itself an absolute indication of the relative sanitary characters of the places or times, and of the progress and energy of their respective sanitary authorities. Unless with limitations, and guided by further investigation, an injustice may thus be haply done. No action of a sanitary authority can influence climate or weather, can provide food, fuel, or clothing, can supply forethought or prudence, or can affect the social habits or the occupations of a population; and for these they cannot be held responsible. There is that, however, which is always in their power—fully and

faithfully to perform their own functions, thereby to blunt the power of evil in that which they cannot immediately affect; and in these very matters to recognize the direction in which further progress is to be sought for, and by their influence to direct public feeling and mould the habits of the community. There is another point, I think, worthy of attention. It will be seen that sanitary conditions being the same, yet the death-rate differs, sometimes widely, from year to year, and from causes, doubtless, which cannot be classed under that head. It is not well, therefore, to look for a diminished death-rate as a necessarily immediate consequence of sanitary improvements in a locality, nor is it wise to press upon the public any smaller death-rate which may happen to occur soon after, as evidence of these good results. The student of sanitary science is not called on, so to speak, to hold a brief even for truth. Rather he should in a judicial spirit weigh the evidence obtainable from all sides, and form his opinion carefully thereon. Sooner or later sanitary work will necessarily tell, and for its results we may afford to wait.

I have spoken of the increase of the wealthier classes in Teignmouth during the last ten years. During the same time the death-rate has been materially decreasing. Is this decrease referrible to that as its cause? is it the result of continuous sanitary labours? or are both of these circumstances factors in its production? Neither ought probably to be excluded. Yet it is not to this decrease in the general death-rate I would look particularly for evidence of the result of sanitary action. I would rather point to the diminished death-rate from enteric fever. The mean of this from 1865 to 1869 was 0·55 per 1,000; from 1870 to 1874 was 0·52 per 1,000; from 1875 to 1879 was 0·39 per 1,000. Much has been done in the town during this time. More strictly each year are nuisances and sanitary defects searched for and remedied, and requirements for health insisted on in new houses; while the public sewerage is in a process of entire remodelling, and means are being taken to increase the amount of its water supply, which in quality leaves little to be desired. By continuance in this course we may well look forward to increasing evidence of what earnestness and perseverance can effect in the conflict with disease and death.

I will now turn to the zymotic death-rate, and strictly sketch what I know of the occurrence of this class of diseases, excluding enteric fever, in Teignmouth. It will be seen that a high death-rate for a year very frequently includes a high zymotic death-rate also, but this is not always the case; in some years it is much the reverse. A *very* high death-rate, though, would appear to indicate a high zymotic death-rate as well, as in the years 1849 and 1858. We may therefore presume that the burial-rate for 1797 of 32·4 per 1,000, the highest death-rate in the whole table, was mainly caused by fatal epidemic disease. Owing to the unusual occurrence of the causes of death having been entered for two or three years in the registers of burials of East and West Teignmouth, I find that 40 of the 105 deaths occurring in 1829 were from small-pox, or at the rate of 8·8 per 1,000. 1833 was the date of a severe epidemic of influenza. In 1842 and 1843, of the 18 deaths from zymotic diseases, 12 occurred from

small-pox; in 1844 there were several deaths from whooping-cough; in 1848 there was a large mortality from measles; and in 1849, which year has the highest zymotic mortality since the registration of deaths began, both small-pox and scarlet fever were excessively fatal. In 1852 small-pox and measles again visited the town, and whooping-cough in 1853. In 1854, 1855, and 1856 scarlet fever again occurred, but mildly, accompanied in the latter year by measles and by a severe epidemic of whooping-cough. In 1857 diphtheria appeared for the first time, at least as so recognised. In 1858 scarlet fever showed itself in the autumn without at first exhibiting any peculiar character; but in connection apparently with the setting in of a strong cold wind from the east, it assumed a character of great fatality, almost confined to the lower classes, and in conjunction with measles produced a zymotic death-rate the next highest to that of 1849. In 1859 scarlet fever continued this loss severely, and whooping-cough appeared with much severity. In 1860 a few cases of diphtheria and of small-pox again occurred, and in 1861 a few of small-pox and subsequently of whooping-cough. During the next three years occasional cases of the latter complaint and of scarlet fever showed themselves, and in 1865 scarlet fever again occurred in considerable force. In 1866 small-pox again appeared, though neither extensively nor severely, and in the autumn of the year Asiatic cholera, from which disease 8 deaths occurred. Measles occurred epidemically again in 1867 and 1868, and scarlet fever very extensively but very mildly in 1869, and to a small extent, but more fatally, in 1870, accompanied in the latter year by whooping-cough and measles. In 1871 small-pox appeared for the last time to the present date in Teignmouth. A solitary case brought into the town was isolated, but through the nurse's disobedience her daughter was attacked by it, and by her it was communicated to her father. This man, pitted by former small-pox, died. This occurrence sent the whole neighbourhood in a fright to the vaccinator, and the disease was thus stamped out. Whooping-cough prevailed particularly in 1873, 1874, and 1878; measles in 1874, 1876, and 1878. Since 1870 cases more or less isolated of scarlet fever have from time to time occurred, but there has been only one death from it in the last eight years, that being of an introduced case.

In calculating the zymotic death-rate, I have followed the usual course, but I do not scruple to express my opinion that the grouping together, under the head of zymotic death-rate, of the death-rates from the seven or eight maladies to which the title 'principal zymotic diseases' has been given is misleading, and in the present state of our knowledge injurious to progress. In public opinion, supported ever by medical authority, deaths from these particular diseases are regarded as peculiarly preventable, and preventable by the direct action of sanitary authorities. With neither of these views can I entirely accord. There are other diseases where mortality is equally preventable by sanitary measures, and the diseases thus grouped together differ much from one another in character, and are very variously amenable to preventive means. Small-pox and enteric fever most probably are strictly preventable, though in different ways. Diph-

theria may possibly be so, but scarlet fever, measles, and whooping-cough are only indirectly so. Over the mortality of the two last meteorological influences have, as a rule, far greater power than those usually called sanitary; while over that of scarlet fever, though both these influences have power, yet in some epidemics of this disease it is difficult to say to what either its mildness or its severity is to be ascribed. For preventing the spread of each of these when developed, isolation (a provision for which ought to exist in every town), if effectually carried out, is a certain means; but with scarlet fever, measles, and whooping-cough, this is the only means of prevention. Enteric fever and small-pox stand in a different, but a separately different, category. It may not be too much to say that enteric fever is a disease whose extinction may be compassed by sanitary means, but can it rightfully be said that vaccination prevents small-pox? Do we not rather deliberately communicate it in a highly modified and a lessened form, in order that it may be passed through safely and at once?

Why, again, should diarrhœa be placed, and separately, in this zymotic group? If measles and small-pox, if whooping-cough and enteric fever, occur in a patient at the same time, we recognise the presence together of two distinct diseases; but do we thus when diarrhœa occurs in their course? Diarrhœa, speaking broadly, is intestinal catarrh, and may result from widely different causes, and be the index of very different states. Diarrhœa may be a form of enteric fever, or of cholera; it may result from poisoning by sewer gases or other similar forms of pollution; it may be a substantive and true zymotic disease, the result of unhealthy sanitary conditions; but it may also arise from unwholesome and improper food, and to a very large extent indeed it yearly owes its origin to meteorological causes, occurring in a period of falling temperatures, and increasing moisture following a hot day or hot and dry weather, and may be regarded as the correlation of the naso-bronchial catarrh which occurs during a thaw after a period of cold and dryness. Why should a malady so various in its character and causation be classed with diseases so distinct as measles and scarlet fever? and why should the mortality from all these be grouped together, when they differ so widely amongst themselves in their relation to sanitary work and measures? Why should not the mortality from each stand by itself, and be considered with reference to its own causes and relationships?

I trust from what I have said now, and in a former part of this paper, that I shall not be thought to undervalue the importance of high death-rates generally as a warning of the presence of sanitary defects or of unhealthful conditions, or that of those from zymotic diseases or from diarrhœa as a part of them. Their importance cannot be over estimated, but to learn rightly from them they must be studied thoughtfully and critically in all their bearings, and I would deprecate anything that would tend to vagueness and a delusive generality in the place of clearness and precision. There is much also in the character and progress of disease, and its relation to the conditions we live in, of which we are still ignorant, but this does not excuse us from the responsibility of action in that of which we are not ignorant. There

have been pestilences of the zymotic class in England, which we now know of only by name, and unable as we may be at present to act directly and consciously on the essential causes of many diseases of this class, yet each year brings these, as other diseases, more within the grasp of sanitary control. By ensuring to the community pure air, pure water, protection from other hurtful influences, wholesome surroundings, and the means of healthful development, we can not only remove the very causes of much of disease, and increase vital power and the capability of resisting it, but we may by these same measures succeed ultimately in blighting the seeds of the zymotic diseases themselves, and in destroying the means of their development. The result of our endeavours will ever belong to God—it is for us in the prosecution of means to follow the precept of the preacher of old—'Whatsoever thy hand findeth to do, do it with thy might.'

W. C. Lake, M.D.

Mr. Chadwick said he should like to know if Dr. Lake had any definite opinion as to how the heavy death-rate in his district might be reduced?

Dr. Lake replied that he had great faith that improvements in sanitary measures would reduce it.

Dr. Richardson said he agreed with Dr. Lake that the question why, with sanitary improvements, the death-rate did not fall, was a very important one. He rather inclined to the explanation Dr. Lake put to it, viz., the great increase of population in advance of the sanitary improvements. He should like to know if the increase of population had been in excess of the improvements. Teignmouth had great advantage in the way of means of sanitation, and they ought to see a great diminution in the death-rate.

Dr. Lewis Shapter thought that sanitarians were laying a little too much stress on the death-rate, and overlooked the prevalence of diseases which were not fatal. In the death-rate they were dealing with disease which was fatal, but they did not deal with that larger class of disease which was preventable and not necessarily fatal. No doubt there was in a town of that class a number of preventable diseases, which did not in any way come in the death-rate, and they could not trace the measure of progress by it. Mr. Chadwick had placed in his hands a new form of death-rate, showing the proportion of deaths from zymotic diseases. He thought that would elucidate a very important point, for at present they could not tell how many deaths out of 100 were caused by scarlet fever and so on. He wished to call attention to this mass of preventable diseases, which Dr. Richardson had hinted might be traced to defective sewerage. One point to which he wished to direct attention was that these diseases came round in the spring and autumn, either in the form of mumps, or measles, or low fever, occurring when the alteration in the temperature would make an impression on the sewerage. Referring to a list of patients at the Exeter Dispensary, which treated this class of diseases, he saw that out of 5,000 cases 1,278 were suffering from a kind of low fever, and the diseases of children. In addition, no less than 7,476 persons were relieved for

diarrhœa, vomiting, and colic. The Dispensary did not deal with the very poorest classes, and yet there were as many as 8,000 treated for this class of diseases in the small area covered by the Dispensary. It seemed to him, therefore, that they should not lay too much stress on the death-rate as on the class of diseases that arose, and more especially those attributable to insanitary conditions. He referred to the choleraic period, as showing that it was true economy to keep our houses in order. It was a question of not letting zymotic diseases take hold of them; if they did, they had the expense of stamping them out, which was far greater than preventing them in the first instance. All this shadowed forth the truth that something more was to be considered than the death-rate in considering the sanitary condition of a city.

Dr. Taylor (of Norwich) remarked that he had spent nine years in the City of Berlin in a quarter where both air and water were tainted with sewer air, and he had not himself suffered in any way.

Mr. Karkeek (Medical Officer of Health, Torquay) called attention to the fact that typhoid fever amongst the poor was very rare in that place. He attributed this to the fact that in the cottages all sanitary appliances were out of doors.

Mr. Rawlinson, in pointed reference to what had been said by Dr. Taylor, remarked that he had probably made as many inspections as any man in the room, and had often come across the "look-at-me" man, as if, because one person suffered no ill from evils, that therefore they were innocent. He had no patience with a man of a cast-iron constitution setting himself up as an example. It was strange that, though, as they knew, dirt created disease, yet that the men employed on sewerage works did not in some instances appear to suffer from disease. But it was a fact that many of the men employed in the sewers could not stand the seasoning. He himself had passed through the hospital on the Bosphorus, where 4,000 or 5,000 of our soldiers were lying, down with putrid fever, and did not contract it; but in inspecting Uppingham School he caught it, and it was only by great care he got over the attack. A good deal had been said about the unwholesomeness of private dwellings; and they knew the poor would close every hole, as they preferred warmth to pure air. He believed that was owing to their not being properly clothed. For his own part, it was always necessary to keep his window open at night as well as by day, but then he was dressed to meet this. He believed that he was right in saying that consumption, which was formerly coddled, and the patient kept in close rooms, was now proved to require plenty of cool air. He believed that if people could bring themselves to live in a temperature a little higher only than that outside they would be a great deal better in health.

After a few observations from Professor Symons, Dr. Lake, and the President of the Section, the discussion ceased.

The Unhealthiness of Public Institutions.

In a paper read at the Sanitary Congress at Croydon last year,[1] I drew attention to the sanitary defects which had been found to exist in some of the older public institutions in this country. Special reference was made to the Manchester Royal Infirmary, which had been reported by Mr. Netten Radcliffe, of the Local Government Board, to be unhealthy from cellar to garret. The defective health arrangements at the large lunatic asylums were referred to, and the condition of the County Asylum, at Frome, where 32 cases of spontaneous erysipelas occurred amongst the inmates, between December 1878 and May 1879, was selected as a typical example of the insanitary condition of the majority of such buildings. At neither Manchester nor Frome could reliable information as to the drainage arrangements of the buildings be obtained, and no proper plans could be found. It was further stated that investigation had brought to light the startling fact, that not 10, and possibly not 5 per cent. of all the hospitals throughout Great Britain and Ireland, possess any reliable plan of their drainage arrangements. Even some of the most important hospitals in the kingdom had no such plans, and it would be easy to give instance after instance of the culpable ignorance which prevailed on this important subject. Remembering the foregoing facts, I ventured to ask, what is the probable condition of the drains of all institutions built some 50 years ago? I much regretted at the time that, through an accident, no discussion was possible last year when I read my former paper. I hope, however, that there will be a full discussion to-day, and that good will result.

It will be noticed that last year I specially referred to old institutions as opposed to recent buildings. I took it for granted, that buildings erected within the last ten years would certainly not suffer either from insanitary construction or defective drainage. From the amount of attention which questions of hygiene have excited, and the numerous and competent authorities who have written and spoken on the subject in all its branches, it might at first sight have been taken for granted, that architects of more or less eminence would have brought much intelligent study to the consideration of the right construction of drains and of sanitary arrangements generally. Unfortunately experience proves the reverse to be the case, and if anything, the newer the building the worse is probably its sanitary condition. Is it not time that the Royal Institute of British Architects took up this question of sanitary construction, and that its Council should make regulations for the guidance, instruction, and training of the rising generation of architects? Such a course will ultimately guarantee the public against the defective, unhealthy, and discreditable condition of many public and private buildings which have been erected under the supervision and from the plans of some of the most eminent men in the profession. It is quite certain that the Institute of British Architects must declare, either that the profession repudiate all responsibility for sanitary defects in dwelling

[1] See page 95 of Vol. I. of the 'Transactions.'

houses and large public institutions, because hygienic arrangements are no part of an architect's business, or they must promptly offer adequate guarantees to the public which will protect it from the disastrous results which now, alas, too frequently follow the occupation of a newly-erected edifice. Suppose a wealthy client pays a large sum for the erection of a new house, which he has been assured by his architect is planned and arranged upon the most perfect system known to modern science. The architect cannot expect that such a client, however much he may be reconciled to the anxieties and increasing expense of each addition to his family, will, without remonstrance, submit to an annual and increasing outlay for sanitary alterations and drainage improvements, rendered necessary by the carelessness or ignorance of the architect himself. It may be thought that new buildings are as a rule carefully erected, and that there is no justification for the foregoing remarks. Unfortunately for architect and client, such is not the case.

Since the meeting at Croydon the following cases have come under my notice, and I hold myself responsible for the accuracy of the following descriptions of three new buildings, *a hospital, a convalescent institution, and a lunatic asylum*, which have all been built, opened, and occupied within the last seven years. All names are purposely withheld.

The Hospital had not been in occupation for more than 18 months when the atmosphere of the building and the ill-health of the inmates pointed to defective drainage and construction. An examination of all the drains, baths, and other conveniences, proved the sanitary condition of the building to be most unsatisfactory. It soon became evident that very considerable alterations were needed to remedy the defects. This new hospital had therefore to be closed within three years of the date on which it was opened. A thorough investigation brought to light the following facts: The cisterns were placed so high that the pressure from the main was seldom or never sufficient to fill them. In consequence there was a gradual choking of the drains throughout the hospital, and an admission of sewer gas to all parts of the building. No man-holes or means of inspection were provided, and the plans of the drains were found to be unreliable. With four exceptions the drains were laid outside the building, but the levels were very irregular. Thus: the level at the lower end of a drain was 1 in 60, higher up it was 1 in 24, and above this again 1 in 125. No wonder that the drains were found to be choked. The pipes also were badly laid. In some places they were leaky, and very foul excrementitious matter was discovered in the soil near them. All pipes were pointed with clay, not embedded in cement, and few were water-tight. In fact, the defects were serious enough to guarantee the admission of sewer gas to all parts of the building. The hospital drains were in direct communication with the town sewer. The rain-water pipes opened directly into the drains, they were untrapped, and as they were only carried to a level with the upper part of the windows of the top wards, they conducted volumes of gas from the sewer to the wards. The soil pipes were all inside the building, and were trapped at the foot, and ventilated by smaller pipes carried up a certain

height and then bent over. These traps were quite inaccessible, and the soil pipes were not properly ventilated, as they were only open at the top, so that no current of air could pass through them. As there was no inlet at the ground level, foul air was forced out through the lower closets into the hospital, whenever any considerable volume of water passed into the soil pipe from the upper floors. The slop-sinks discharged into the soil pipes, and were practically untrapped, so that by their means sewer gas was laid on to every ward in the hospital. There were other defects, but I have given enough detail, and no one will be surprised that the sufferings of the surgical patients and the general unhealthiness soon compelled the committee to close the hospital.

The Convalescent Institution stands in its own grounds of 8 acres. It is beautifully situated. It has extensive gardens, and every convenience, not to say luxury, that modern taste could suggest. The cost of the site, buildings, &c., was upwards of 50,000*l.*, there is accommodation for some 200 patients, and it has been occupied for less than five years. Within a year of its being opened there was a sharp outbreak of erysipelas amongst the patients, and the institution was closed and fumigated. It was noticed at the time that all the conveniences opened into the building directly opposite the wards, and a suspicion of defective drainage arose, but was not credited, owing to the fact that the building had been occupied for barely one year. A few months ago the unhealthiness of the institution was so marked, that the committee gave instructions for a complete examination of the drainage system. No plan of the drainage could be found, but one was ultimately furnished by the architect which proved to be incorrect in many particulars. All drain pipes, &c., were found to be in and beneath the building. The baths, lavatories, and sinks opened directly into the sewer, and many were untrapped. In that portion of the building allotted to the officers, owing to an ingenious arrangement of the lavatories and the pipes connected with them, sewer gas was admitted at both ends of each floor. The ventilation of the drains and sewers was so defective, that during certain winds the sewer gas was driven through and into the building by means of the ventilators. Some of the drains were laid up-hill, all were pointed with clay and not embedded in cement, and all leaked. The main sewer as it passed from the building was laid at irregular levels, and in more than one place, owing to imperfect workmanship and improperly made ground, the pipes of which it was composed were not in contact with one another. The main sewer had to be entirely relaid. All the drains were taken up, and with the soil pipes were placed outside the building. It is not to be wondered at, in the face of the foregoing facts, that instead of being a convalescent institution, these defects of construction compelled the convalescents to return, not to their own homes, but to the hospitals from which they came; whilst the majority of the resident staff were placed on the sick list. Yet the architect had in this case unlimited funds at his disposal, and the fullest liberty to do all that he thought necessary or desirable.

The County Lunatic Asylum has been opened for the reception of patients for five years. Built regardless of expense, it was supposed to

contain all the most recent improvements in lunatic hospital construction. Almost from the date of its occupation it has been the scene of outbreaks of dysentery and erysipelas. During the first eight months of 1879, cases of these diseases were of constant occurrence on both sides of the asylum. There were twelve fresh cases of dysentery and four of erysipelas every month.[1] Suspicion having fallen on the state of the drains, a competent engineer was ultimately appointed to examine them. Numerous faulty points in the system were detected, the rectification of which has been followed by the disappearance of dysentery and erysipelas from the establishment.

I have here given positive proof from the experience of the past twelve months alone, that the architects who have been entrusted with the erection of these large public buildings devoted to medical purposes, have shown an ignorance, or, if you prefer it, a total disregard, of the elementary principles of sanitary science. I content myself with stating these facts. I refrain from comment, but I appeal to the Royal Institute of British Architects to apply a remedy which will prevent like abuses for the future. If they fail to do this, then let them boldly hand over all matters affecting drainage and sanitary construction to the engineer. By this means they can readily avoid a heavy responsibility, and save their profession from much discredit. I must, however, leave the decision to the professions more immediately concerned, and I hope the discussion which may follow this paper will lead to a satisfactory settlement.

It behoves the public to take the question up from a different point of view entirely. Private houses and public institutions are not free, as they ought to be free, from preventable impurities, and they are too often highly dangerous abodes for anyone who has a tendency to zymotic disease. No permanent prevention is likely to be secured without a thorough, an independent, and a periodical inspection of all the structural and drainage arrangements of these buildings. A central office for the safe custody and registration of the drainage and other plans of all public buildings, hospitals, and private houses is a much needed reform. Competent inspectors and a central repository might be secured for a reasonable outlay, which would be over and over again repaid to those who were sensible enough to avail themselves of its facilities. At the present time no one seems to think of drainage arrangements. Nearly everyone is contented with a taking exterior. Yet the magnificent elevation of the block of new buildings known as the new Government Offices did not protect its inmates from the inconvenience and danger attending the presence of several inches of liquid sewage, which was found in the basement of the Home Office within a few weeks of its occupation. Could the Congress better employ its time, than in appointing an influential deputation to the Local Government Board, to recommend strongly the adoption of the necessary remedies for the removal of the evils which have been brought out by the facts detailed in this paper?

HENRY C. BURDETT.

[1] Brit. Med. Journal, September 4, 1880; page 401.

DISCUSSION.

MR. ERNEST TURNER (London) said Mr. Burdett's paper was a very interesting one, and had two sides—a comical side and a serious side. It was certainly rather comical to hear Mr. Burdett blaming the architects for not taking care to exclude sewer gas from buildings, which owed its existence in the sewers to faulty engineering, and then to hear him shortly afterwards suggesting that the architects should boldly hand over all matters affecting drainage and sanitary construction to the very people who caused the evil, or who at any rate constructed the sewers in which sewer gas accumulated. Lord Fortescue had referred on the previous night to noticeable defects in lately-constructed sewers. But who had constructed them? The answer was, sanitary engineers, and not architects. The truth was, there were engineers and engineers, and architects and architects, and the functions of the two were distinct. The engineer should know how to dispose of sewage, and the architect should know how to drain the buildings he erected. But both professions had yet much to learn, and he did not believe that either of them was at a standstill. Anyone who had read the *Builder* would know that the editor of that paper was a pioneer in sanitary reform, and that to him attached the honour of being the first to call public attention to the fever dens in different parts of the country, and give prominence to sanitary construction in all its branches. The Society of British Architects had for years been trying to get the Legislature to make examinations compulsory, but in this they had failed. But no one could be admitted to that Institute until he had passed an examination in which sanitary construction and drainage were included. What the engineers had done he did not know, but he did know that there were many able men amongst them, and on the other hand there were some totally incompetent, holding responsible positions, and having charge of the sewers of large districts. He was lately asked to inspect a house where the occupier was told the drains were perfect. On examination he found that all the drains were below the level of the sewer, and this was also the case in several of the adjoining houses. That was a serious matter, and what, he asked, was the use of Boards of Health and Vestries making regulations and not having responsible officers to see that the regulations were complied with? Before new buildings were erected plans should be submitted, and the drains should be inspected after they were laid. As to the burning question of excluding sewer air from buildings, there was nothing more simple, though from the hundreds of patent advertisements they were led to believe that it was difficult. Between the house and the sewer there must be a simple syphon trap, and a portion of the drain between this trap and the house must be open to the air. All the soil pipes should be carried above the roof and open at the top. They would then have a current of fresh air always passing through the drain and soil-pipe. Disconnect from any drain or soil-pipe every waste pipe in the house, and let every waste pipe discharge on to, not into, a water-trap. The noxious gases in the sewer still remained to be dealt with but that

was the work of the engineer, and he should be required to do it. Mr. Turner moved a vote of thanks to Mr. Burdett.

Dr. Domenichetti, Medical Officer of Health (Louth), in seconding the motion, said the art of sanitation appeared very simple from the address of Mr. Burdett. As to the army of inspectors suggested, he would only say that he considered that in the present body of health inspectors they possessed a very valuable body of men. At least that was his experience in Lincolnshire, where he resided, and he believed that large towns could be properly administered if a proper staff of officers were provided. He gave instances which had come under his notice in which this was done.

Mr. W. White (London) desired to express his thanks to Mr. Burdett for the valuable paper he had given them, and also to Mr. Turner for the defence he had made as to where the responsibility rested. The speaker pointed out that it was only within the last few years that the science of the management of sewer gas had been worked out by the great intellects of the day in the medical, engineering, chemical, mechanical, and other scientific branches. Therefore it was rather hard to say that the architect who provided the building was to initiate all these scientific investigations which had occupied most scientific men of the time for many years past. He, however, believed that the architects had been doing their best to remedy the defects that existed.

Dr. Alfred Carpenter said he could not allow the paper to pass without remark. It dealt with two matters—principles and details, and he thought principles rather than details should be dealt with by the Congress. They owed a debt to the people of the city for the reception given them, and they could not pay it better than by dealing with this matter. It was quite certain that people did not know the right way to execute these works, and therefore engaged persons to carry them out who they supposed were properly qualified for the purpose. But, as they knew, a large number of the officers appointed by the local boards and others were totally ignorant of what was required. He had seen work carried out by men well known in the country who were totally ignorant of sanitary hygiene and of the first principles of sanitary construction. Consequently, the works they had managed had failed. When men were appointed inspectors of nuisances in large towns, it should be seen that they knew something of the duties they undertook. But inspectors of nuisances, as a general rule, knew nothing of their duties, and, indeed, he believed that nine-tenths of the surveyors and inspectors were not acquainted with the first principles of sanitary laws. Those who had paid attention to these questions knew that some sewers were apparently made for the purpose of creating sewer gas. Sewer gas was no part of the sewer system, and any engineer who made a sewer which created gas made it improperly, and wasted the money of people who trusted him. One of the objects of the Institute was to endeavour to get officers appointed who knew their duties in this respect. As to the appointment of medical officers of health, he would warn them against appointing men on the understanding that they were not to do their work. If they appointed a medical officer for a large district at a salary of 25*l.* a year, they would know that he was appointed with the understanding that he was not to do his duty.

Mr. E. J. Domville observed that they had somewhat wandered from the subject, which was the unhealthiness of public institutions rather than that of private houses. As an old officer of a public institution, he should like to bear testimony to the rather remarkable difference between the recurrence of such diseases as were usually engendered in hospitals—in the Exeter Hospital and the hospitals in London. Coming straight from one of the London hospitals, he was much struck by the freedom of the Exeter hospital from pyæmia and erysipelas. The question was, what was the reason for the difference? It seemed to him that, to a large extent, the overcrowded state of public institutions was the cause of this disease. But in the Exeter hospital he noticed one point which was remarkable, and which, as far as he knew, did not exist in any other hospital, viz., the custom of spreading the cases of the surgeons all over the hospital, and spreading them amongst those who ought not to be there at all, persons suffering from chronic diseases, and so on; and this, perhaps, might have had something to do with the very few cases of the particular diseases he had mentioned. As to the question of sewerage, it seemed to him that it was not only a question for the architect, but that they must go far lower, and impress upon the workmen the necessity of carrying out the orders they received; for at present they seemed to think that an inch or two of difference in the sockets, or the use of clay instead of cement foot-joints, made no difference. He did not think that the working classes were aware of the responsibility that rested with them for the evils arising to the health of families by bad work of this character. Supervision was also necessary, and no sewer or drain should be closed until it was inspected. By this means they would get a plan of the drainage, which was as necessary as that of the elevation.

Mr. Square (Plymouth) thought that between the architects and engineers the public had a right to look for security.

Mr. J. Towle (Oxford) observed that it had been said by Dr. Carpenter that there ought to be no sewer gas in their sewers, and he went further and said there ought to be no pernicious gas in their towns. The question was raised at Glasgow whether it was possible to remove the pernicious gases from our towns in twenty-four hours. He had worked this matter out, and had come to the conclusion that they could carry everything out in twenty-four hours, so as to prevent sewer gas arising.

Dr. Richardson said that up to the middle of last century hospitals were in a bad condition, but in 1762 there was a great revival in the building of hospitals under the direction of Mr. Gooch, of Norwich, who built upon a plan laid down by an intelligent architect. Some of these hospitals were exceedingly well constructed, but he would point out that in the end the concentration of so many patients and the saturation of the place itself proved injurious to them. The point to be gathered was that they should never build hospitals as if they were Norman castles. They should be built in some simple way,

so that they might be removed and reconstructed. At any rate, a hospital should be so built that it could be partitioned into wards that could be taken to pieces, and reconstructed at pleasure—so arranged that they could be taken away piece-meal and repurified. In that case they might have hospitals that might be permanent. But in all cases care should be taken not to build large hospitals. To concentrate the sick in a large hospital like that of St. Thomas's (Lambeth) was not desirable, and that hospital should be spread all over London. As to the removal of the sewage of hospitals, he was not sure that the earth system was not the best for sewage, but with regard to all other matters, such as dressings, they should be destroyed by fire. The walls of hospitals, too, should be lined with sheet-iron, so that a brush of fire could be passed over the walls and destroy all organisms.

Mr. H. C. Stephens suggested that the Institute ought to be able to insist upon there being a means of testing the capabilities of inspectors, through the Local Government Board, who had to confirm the appointment to ensure half of the salary being returned to the Local Board.

Mr. E. C. Robins (London) thought neither architects nor engineers generally were properly qualified to deal with these matters at present, and he advocated a system of examinations before admission to the profession. The City of London guilds were giving practical teaching to workmen.

Lord Fortescue was glad to hear that the Society of British Architects had taken steps to hold examinations before admission to their body. He could not conceive the gross ignorance that in old times was displayed by architects of ability, and who had a great name; therefore he was not surprised to hear what Mr. Burdett had said. He hoped and trusted the Engineers' Institute would recognise it as a duty they ought to perform to test the capability of persons entrusted with the execution of sanitary works. Unless this were done, thousands and tens of thousands of pounds, instead of benefiting the community, would be wasted. Referring to the appointment of inspectors and other officials of that class, he said that one of the melancholy parts of local self-government was the extent to which it led to local jobbery in the appointment of officials. In one case, he knew, it was used as an argument in favour of a man desirous of trying his 'prentice hand at sanitary matters, not that he was himself a 'talented young townsman,' but that he was the relative of a townsman. He thought the Local Government Board might refuse to sanction appointments unless some *primâ facie* evidence of fitness was produced. He was glad to find that one of the objects of the Sanitary Institute was to test the capabilities of public officers, and to urge the advisability of examination being compulsory. Another important matter was to get workmen and foremen to understand how nearly the life or death of those who were going to live in the houses they built were in their hands. He had known most scandalous work for the sake of some paltry plunder, or because it should be done over again: that was to say, men did things badly with the

idea that they were 'making work.' Men who would be shocked to give a blow that would injure a fellow-creature, would yet carelessly follow that abominable principle, and, in order to make work, endanger the health of the community.

Mr. J. Dixon (Winslade) thought it too much the practice of architects in building houses to consider the connection of drainage and soil pipes as subsidiary matters, and leave the plumber to put his pipes as he thought fit. Divided responsibility, as they knew, was no responsibility, and he thought the architect was the man who should be able to say that the structure was sufficient and adequate for all sanitary purposes.

Mr. Henry C. Burdett said he had been much gratified by the discussion, because he hoped that its influence would radiate far beyond the confines of that room by means of the press, and that one result would be that there should follow immediately a marked improvement in the work of the engineer and architect, with the result that justice to the public would be done. If that justice were done, then his purpose would be achieved. As to the arrangements by which local officers were appointed, he might recall the attention of members of the Institute to the fact that the Institute endeavoured to get recognition from the Local Government Board to its certificates to inspectors and surveyors after examination. The Institute had appeared twice in deputation before that department; but it transpired that there were difficulties in the way which it would take some time to remove. The Institute would, however, not lose sight of the matter. He would now bring the meeting back to the dangers of occupying new hospital buildings arising from the work which had been badly done. He was sorry to say that cottage hospitals were getting as subject to the evil of bad drainage as others, from the fact that the old cottages with their outside middens were being replaced by specially erected cottage hospitals with sewer gas laid on from a closed and unventilated cesspool. This was one of the dangers of over prosperity. It would be far better to occupy the old cottages than to transfer the patients to these insanitary, though specially erected cottage hospitals. He trusted that what had been stated would lead to improvement in these matters.

The President, in putting the vote of thanks (which was carried *nem. con.*), pointed out that much of the unhealthiness of hospitals, which had been built in the last century on a good plan, arose from the ignorant action of administrators in later times, in filling up with additional buildings the space wisely left by the original designers as a means of circulation of air round the edifice. He cited as a well-marked example the case of the Norwich Infirmary.

Sanitary Blunders and Practical Schemes for their Removal.

Every great reform, whether moral, social, or political, has been effected by a series of experiments more or less elaborate and costly, always attended by failure involving heavy loss, and the necessity of finding other means of carrying out the desired end. One remarkable fact in connection with almost every great change has been the adoption of the most complicated and difficult methods of obtaining the desired end, and it has only been discovered after repeated failures that success lies in the adoption of some of the simplest ideas. This peculiarity has attended the efforts put forth to bring about the much-needed sanitary reforms, and after years of experiments and the expenditure of enormous sums of money, the sanitary arrangements of our cities, towns, villages, and private residences are as defective as it is possible to conceive. Men of marked ability and of scientific knowledge have devised and adopted schemes, which have been carried out at the ratepayers' cost, only to be proved inadequate to remove the evils complained of, and to-day we have the very earth on which our cities and towns are built impregnated with the poisonous exhalations and gases which our engineers have tried in vain to confine in the sewers which intersect our streets in every direction.

Finding their efforts useless, they have of late advocated ventilation, and provided methods for effecting the same.

To show the need of reform, it may be permitted to examine the present systems adopted for ventilating our drains and sewers. Of course in the main sewers ventilating shafts are now adopted, but that they are quite inadequate is proved by the necessity of adopting some other means in every private house where the inmates value health and possess the means of applying the same. It is in the schemes adopted by private individuals that such strange complications are to be met with, and such a variety of plans carried out, proving that those whose business it is to execute this class of work, as well as those who employ them, are utterly ignorant of the elements of sanitary science. To begin at the lowest round, we see a pipe carried from a D trap, or soil pipe, not larger than three-quarters of an inch in internal diameter, to the roof, and this is supposed to obviate the evil of allowing sewer gas to enter the house. Generally speaking the upward current of air through this miniature outlet is entirely prevented by sealed traps above and below its position in the pipe supposed to want ventilation. This state of things in constantly to be met with in some of the best residences, the inhabitants confident that they have applied the best known means of preserving health from invasion by this source of disease. And it is very rare indeed that we find any departure from this system, the only improvement being an increase in the diameter of the ventilating pipe to, say, two inches; but in nine-tenths of the applications the water seal traps are adhered to, and consequently a free air passage is impossible.

But the great defect in the system of ventilating cowls is that when we want our sewers purified the most, viz., when the weather is excessively hot and close, and not a breath of air can be felt, they cease to work, because the motive power on which they depend (the wind) is absent. There is no system which can be depended on in all temperatures and at all seasons to remove the gases which are continually being thrown off, and more especially in the hot summer months. I will now give my idea of what is required to perfect these methods of sewer ventilation. Every sewer and every drain running into it from every source should constantly have a quick free passage of air passing through them in such a volume that every foot of surface should be acted on continually by that best of all vehicles for removing and dispersing offensive and dangerous collections of gases, which now fill the sewers and seek admission into our living apartments by every possible channel—the atmosphere. There should be no trap required or allowed in street or house, in bedroom, lavatory, or scullery; but there should be common open grids with air constantly passing through them as freely as the liquids they are constructed to carry away. To effect this in our towns and cities we have only to make use of means at present existing, and I need only mention them to prove at once their efficacy. The working details will readily be supplied by every practical engineer. Instead, then, of deploring the existence of steam boilers with their roaring furnaces, of gas-generating furnaces with their constant and intense heat, and other such fires where a continual consumption of fuel is taking place, as so many checks to sanitary reforms, let us make use of their enormous demands for air to keep up combustion, and compel them to take their supply of air direct from our sewers. Not only would the demand exhaust the foul contaminating gases there confined, but the continual rush of air to these furnaces would carry with it all fever germs, to be for ever rendered harmless by the fiery ordeal through which they would be compelled to pass; whilst through every open grating in street and house the purer air would pass to supply the place of that exhausted.

Some will say, 'Your plan can only operate where such facilities exist; in the best parts of the towns such means could not be found.' But there the same principle can be adopted. All practical men know that in the kitchens of our large houses large fires are constantly going, and the whole of the brickwork gets heated. Behind these fires chambers may easily be formed communicating with the drains, and in these chambers the air would be rarefied by the heat, and a perpetual ascending current would be the result, exhausting night and day the impure air of the drains, and effecting beneficially the ventilation of kitchen and scullery. And this arrangement would apply to isolated country houses and all positions.

To further perfect this system, let a bye-law be passed by the Board of Works, making it imperative that every new building shall have a ventilating shaft constructed immediately behind the kitchen chimney, and in connection with the drains, and as large in area as these drains are, so that every dwelling in that way should independently aërate and purify its own sewer arrangement.

The plan here proposed is not complicated; it depends for its successful working on heat, which every habitation requires every day; it involves no other demands than bringing into practical use the heated surroundings of every kitchen fireplace. In the case of private houses and localities where the first-named facilities for the wholesale purification of the sewers does not exist, its adoption will prove an incalculable blessing, for it will exterminate an enemy which has continually conspired to undermine and destroy one of his most valuable possessions, health.

RICHARD LEE, JUNR.

Forty Cases of Illness following Sanitary Neglect.

THAT the neglect of decent arrangements about human dwellings can possibly cause disease, is, strange to say, a truth still unadmitted by many of the community. With some this is due to ignorance or indifference; with others to self-interest, because it would cost them money or trouble to put things straight. Some people stand up for individual or corporate rights. Liberty of the subject is made to confer the privilege of cherishing small-pox in one's house, or any accumulation of filth, or other insanitary arrangements, on one's own ground. One man claims a prescriptive right of drainage into the next open ditch; another thinks it very proper to pile up stable-manure under his neighbour's windows; another has a vested interest in bone-crushing, rag-sorting, soap-boiling, candle-making, or some other process that poisons the air. Such a man feels bound to maintain in its existing condition some low and miserable but lucrative house-property; and such another man has on that spot an established right of horse-pond, which none may touch. With these persons you cannot argue; the law may now and then do so with effect, but not always; and there are many sanitary duties which are private and personal, with which it is not the province of the law to interfere. But it is possible by perseverance to convince the ignorant, and to build up and maintain a certain public opinion on the subject, by accumulating and setting forth instance upon instance of the production of disease by the neglect of sanitary measures. It is to contribute towards this that I submit the following cases from my own personal experience.

1. Several boys in a school of a superior class were attacked with fever. There were three or four severe cases, and one death. Large cesspools existed close about the foundations of the house, and bad smells were at times perceived.

2. Two cases of fever were received into a hospital. Similar cases had often been admitted, without any bad effects. But on this occasion the fever spread. Four persons, if not six, died, and about four more were dangerously ill. Bad smells had been noticed about the house; and shortly after the fever, it was discovered that several enormous cesspools, full of fœtid matter, were under the foundations

of the house, and that one of them in particular sent its vapours through numerous openings into one of the rooms.

3. A bad case of phlegmonous erysipelas was admitted into a London hospital. The patient stated that nine days before, a large sewer, passing under her house, was opened; and in the afternoon of the same day, she was attacked with shivering, which recurred for two or three days, when phlegmonous erysipelas came on. This patient died.

4. A lady died of fever in a house the drainage of which was supposed to be perfect. I examined the premises. On entering the back-yard, I was instantly sensible of a strong offensive smell, and on looking round for its cause, discovered a large open grating, communicating directly with one of the town sewers. This grating had never been noticed, and no doubt had emitted the poisonous miasma, which must constantly have entered all the back windows and doors of the house. Further search disclosed a long rat-hole opening beneath the dining-room floor and passing directly into the same sewer. These and other matters were immediately put to rights, and no further illness arose.

5. A lady in London had low fever, which ran a very lingering course, ending in recovery. She had often been annoyed with offensive smells coming from the back of the house, believed to arise from a cow-yard.

6. A case of low fever occurred in a sea-port town in a house near the quay. The town was drained into the harbour, and the mud at low water all along the quay sent up a considerable stench. The streets and alleys of this town abounded in cesspools and accumulations of filth; and fever was very common.

7. A case of febricula also occurred there in a young man engaged in breaking up a dirty old ship.

8. An infant was attacked with capillary bronchitis. He lived in one of a nest of cottages belonging to an owner too poor to keep them in order, and there were abominable collections of filth. The disease became asthenic, and the child died.

9. A father, mother, and several children, were all successively ill with inflammation of the mouth. Their cottage was absolutely without either ventilation or outlet both at the sides and back.

10. A woman with phlegmonous erysipelas, caused by smells from a cesspool.

11. A child with low bronchitis and canker of the mouth, died. The residence was over a stable, and the smell of stable manure was constantly present in the rooms.

12 to 30. Bronchitis, fever, &c., connected with foul air.

The cases from No. 7 to No. 30 were dispensary out-patients visited at their own homes. In each there was distinct exposure to sewer gas, emanations from cesspools, or the smell of stable-manure —which last I have always noticed to be highly deleterious.

31. Child with diphtheria. On entering the house, the smell of sewer-gas was instantly perceived; and on inquiry, it was found that the bell-traps had been removed from two sinks, and had so remained for some days.

32. An artisan came to me with sore throat. After inspection, I told him it was caused by sewer-gas. He assured me the drains, &c., were in perfect order in his house, and that he was excessively particular about such matters. After a few minutes, he suddenly recollected, that several days previously he had been employed for some time in putting a lock to a door, where there was an offensive smell as from sewers, which annoyed him and seemed to get into his throat.

33. A young lady was ill for some days with asthenic bronchitis, after being exposed to emanations coming in at a window from a dust-hole which the dustmen had neglected to clear out.

34. A tradesman's wife was several times ill with asthenic bronchitis, from breathing exhalations from a refuse-heap.

35. A gentleman was attacked with tracheal catarrh, partly from getting wet, partly from breathing foul air arising from the mud of a tidal estuary and offensive emanations from a brook into which house-drainage fell. A lady was severely ill with influenza, brought on by the smell of the mud of a harbour at low water, to which smell she was once exposed for a few hours.

36. For some years the young children of a small tradesman were attacked once or twice a year with erysipelas of the head or face, sometimes one child, sometimes another. The closet, as usual, adjoined the house at the back, and I have no doubt that emanations from it got into the house.

37. During many years the children of a wealthy farmer were frequently ailing, though without any distinctly zymotic illness. Large farmyards were close to the house, around which the smell from manure, &c., was usually perceptible. I do not doubt that in this case, some of the illnesses were caused by these emanations, though this could never be ascertained with certainty. I was of a similar opinion respecting several other families, but could not trace anything out to act upon.

38. An infant, frequently ill with one ailment or other, lived in a house at the foot of a hill. The drainage was suspected, but not known, to be wrong. The child was moved to another house a little way up the hill, and from that time was always well and hearty.

39. An infant was ill with canker of the mouth, brought on by foul air and bad food.

40. A gentleman requested me to see his coachman, who was ill with fever. He was living in well-appointed rooms over the stable, which was carefully ceiled; yet the smell of stable-manure pervaded the whole place, and I have no doubt helped to cause his illness. A flydriver's wife, living in rooms over a coach-house, was suffering from low fever, which I attributed to the smell of stable-manure. In several other instances it has appeared to me that serious illness was caused by living over stables. A gentleman in London was made ill by the smell from the stable which penetrated into the dwelling-house.

One more case I must give. A gentleman was confined to his bed with a fractured patella. About the sixteenth day he was attacked with pneumonia, for which no other cause could be traced

than the emanations from a neighbouring water-closet. The door of this was generally left ajar, and the place had, as usual, but a single window for ventilation. A somewhat similar case occurred with a woman in child-bed, mild fever being the result.

These are but samples of much more that could be given. It is not safe to believe that the first rudiments of sanitary science have been sufficiently taught. There are many people who either do not know them, or, what is even more frequent, do not attend to them and carry out their teachings. Cesspools are not yet things of the past. Refuse-heaps, manure-heaps, offensive trades, crowded collections of animals, yes, even sometimes of human animals, are not yet swept away. They are sometimes hid round corners, and in nooks, towards which the eyes of inspectors do not always seem to bend. I have seen nuisances, years ago complained of and supposed to be removed, still existing, and nearly in the original state; sanitary evils, long pointed out, not yet remedied; nuisances, which the arm of the law ought to have long ago reached, but which it seems to have no power to interfere with. In short, considering the talk and stir about sanitary matters which has gone on for these thirty years, and allowing for good things done and arrangements made, it looks as if some localities were not much the better for it all. It may be that health officers do not find themselves sufficiently free to do their whole duty. It is certain that some of them are very insufficiently paid. And it is also certain, that sanitary measures are not yet supported by the voice and vote of the whole community, and that both the knowledge and the disposition to do these things rightly are not yet possessed by all.

W. E. C. Nourse, F.R.C.S.

On the Past and Present Prevalence of several Diseases, as influenced by Food, and by House Drainage.

The following remarks relate to the causation and prevention of diseases, the object of all sanitary work. This kind of work is, we know, of quite recent origin; some of us may have helped, in our day, to develop it; yet, long ago, before the work or its name was thought of, the progress of human improvement did something to banish disease.

Thus, during the middle ages, leprosy was so common in the British Islands, that leper-hospitals were founded everywhere, and their sites are still known by the name 'Spital.' Leprosy receded and grew less common, according as improvements in agriculture and horticulture, and in the rearing of live stock, furnished better, more regular, and more abundant supplies of food, both animal and vege-

table. Fresh food began to be more easily obtained; it was less necessary to live upon salted or dried provisions. And as by degrees the art of food-producing became more perfect, leprosy disappeared; first from England, afterwards from Ireland and Scotland; lastly, from the Orkneys, Hebrides, and Shetlands, lingering longest precisely where the methods of raising abundant regular supplies of fresh food were least practised, and still causing cases of the disease among people who were unable to procure such nutriment. Very rarely, a case of leprosy in a person who has never been out of England still occurs. One such case is recorded by me in the 'Medical Times and Gazette,' for September 2, 1865, page 251. But the present rarity of leprosy, contrasted with its frequency in time past, forcibly reminds us of the value and importance of good, fresh food, in the maintenance of life and health, and in the prevention of disease.

A similar lesson is taught in the history of a small parish in Sussex. Fifty years ago, ague was prevalent there; but lately, and for some years past, it has never been heard of. The disappearance of ague is usually attributed to the draining and reclaiming of marshes; but there is no marsh in or anywhere near this parish, nor has any alteration been made in the surface of the land. But there has been a material change in the condition of the people. Their standard of living has been improved, both by the rise in wages and by the increased demand for day-labourers. Fifty years ago, men were frequently out of work there during the winter, and their families were almost without food; parish relief had to be given them, and landowners employed them in planting waste land. A riotous mob burnt a threshing machine in the parish, because 'it took the poor man's work away from him.' But now, side by side with the introduction of all sorts of machinery into farm-work, it is very difficult to obtain a labourer. I believe the disappearance of ague in that parish, which is intimately known to me, is owing to the people being better fed than they were fifty years ago, and therefore being unaffected by the slight malaria, which arises from woods and fields in most country places, which diluted malaria, when formerly the people were not so well fed, gave to a certain per centage of them ague. It is likely that the history of many English parishes would furnish similar instances.

Thus may, and does, good food keep off disease, both ague and many other kinds, by so upholding the strength that well-fed persons exposed to deleterious influences are less frequently made ill by them. Proper food also banishes leprosy, scurvy, and diseases of that stamp, in a way more direct, by improving the condition of the blood. Well-nourished people recover from illnesses, which carry off persons who are under-fed. These things point out to us the enormous value of extended and diversified means of abundant food supply, and of doing everything to cheapen good food, to bring it within reach of all, and to make generally known the best modes of preparing it. No sanitary measures can equal this. The food question stands first. The introduction of every new article of food; quicker or more plentiful methods of raising food; the making two ears of corn grow where one only grew before; the teaching of cookery; improved ways of preserving food, of making it portable, and of transporting it; and

the establishment of food-museums in large towns; all these are a boon and benefit to mankind, and tend to banish pestilences and epidemics, and to minimise sickness and mortality. Feed a people well, and they can defy an astonishing number of sanitary errors. Diminish their food, no matter by what means, whether by scarcity, or by want of money to buy, or by indulgence in alcoholic drinks or other matters that destroy appetite, and straightway they fall victims to the miasma from drains and cesspools and refuse-heaps, to want of ventilation, and to every other sanitary blunder.

I question if some of our supposed domestic improvements be not sanitary blunders. Every house must now have within it a place with water-pipes and machinery, which years ago were not needed in the small edifice at the end of the garden which then served the same purpose. These pipes communicate with drains, and are neither more nor less than conductors into our houses of poisonous gases, which our forefathers, with all their shortcomings, kept at arm's length. I repeat, they are conductors of miasma into our houses; for, however well-constructed they may be, they cannot be always perfect; and every slight leakage, every little derangement of valves and levers, every deficiency of water, and also the carelessness of those who use them, may and does occasion some ingress of bad emanations into our dwellings, the effects of which, in causing illness, every medical man of experience has observed. The same applies to indoor sinks. It is since these triumphs of the plumber's art have come into general use, that typhoid and diphtheria have been frequent in this country. Forty years ago these diseases were scarcely heard of. Typhoid was not known by name, though the researches of Broussais had pointed out a typhus-like fever which yet differed from typhus. And though now and then cases of this typhoid, better named enteric fever, were met with, still at that date, even allowing for its not being always recognised, it was not nearly so frequent as at present. It is supposed by many that diphtheria was then unknown. It was certainly very uncommon; very few medical men had seen it; but of late years it is only too frequent. Now, the increased frequency of these two diseases manifestly accompanies the general introduction and use of water-closets within our houses, an arrangement well known to have caused diphtheria, typhoid, and other illnesses in numerous instances, by some part of the apparatus getting out of order, and occasioning contamination either of the air or of the drinking-water. Obviously, there can be now no need to enumerate cases in proof. That it is so, will be conceded by all who are conversant with sanitary affairs; and those to whom the matter is not so clear can soon convince themselves by reference to recorded instances. But what I wish, in conclusion, to direct attention to, is the custom of late years adopted, of introducing into every house a tube which communicates with drains, and the prevalence of typhoid and diphtheria since this custom became general. Indoor closets should only be used when necessity compels; and the arrangements connected with them, which are generally very defective, should be wholly altered. Every such place should have two windows or apertures so as to cause a constant thorough draught through it, and should also be efficiently shut off

from the rest of the house by a closely-fitting door. Till all these points are attended to, which they most certainly are not at present, preventable illness, of more or less serious character, will constantly occur.

And now, having mentioned in the first part of this paper the importance of augmenting our food supply in every direction, I will add a word on the subject by way of appendix. Respecting animal food, what reason is there why our main supplies of meat, now so high in price, are to be derived only from the sheep, the ox, and the pig? With all our zoological information, can we think of no other animal, besides these three, that is adapted to furnish a meat supply for ordinary use? Because the experiment with elands, and with one or two others, failed, can nothing else be tried? It is easier to ask these questions than to answer them; yet that is no reason why something should not be done. The kangaroo, the wombat, many sorts of deer and animals allied to them, the bison, the zebu, the camel, and others, furnish excellent food. We hear much of horse-flesh; it is also said that the meat of donkeys and mules is good. It is a pity the reindeer cannot be utilised in England, for its flesh is excellent. Fish-culture, again, is yet in its infancy, and might be widely extended, and made to include the better sorts of shell-fish. Hundreds of tidal estuaries now lie idle, which might be turned to some useful purpose in connection with this. Respecting vegetables, again, and cereals, it is astonishing, considering the hundreds of thousands of species in botanical lists, that so few kinds are appealed to for human food. Small supplies of new descriptions might be obtained from many plants now neglected; but the great gain would be if anything were discovered to add to our main crops, to stand side by side with wheat or the potato. Having seen something of the Irish potato famine, the deserted villages and roofless cottages, the ground torn up around them to gather roots to boil for food, and the fields of good land lying waste which no one dare till or put stock on, I am deeply impressed with the importance of not trusting to one or two species from which to raise food, but of putting in requisition as many kinds as possible, both of plants and animals, to furnish this first essential for the health of the people.

W. E. C. Nourse, F.R.C.S.

Mr. White (London) said he should like to ask a question with special reference to the village in Sussex, in which fifty years ago the people were subject to ague and such-like diseases. He was informed that these diseases had been in great measure remedied by the better provision made for the population. He should like to ask if it was not the case that there had been a material change in the structure of cottages in the ague districts of Kent and Essex. In the old days, when the cottages were almost exclusively on the ground, the absence of ague was never known; but as soon as the cottagers began to live eight, or even six feet above the ground, these symptoms disappeared. He should like also to know as to the soil, and whether its tenacity was such as to hold the water and throw off injurious exhalations. As an instance of the effect of sewer air, he mentioned the

case of poisoning at Welbeck, where a number of persons were poisoned by partaking of sandwiches made from a ham kept in a larder in which there was communication with a sewer.

Dr. Taylor (Norwich) said he thought that *per se* sewer-gas was credited with more disease than it was accountable for. Berlin, as they knew, was a city of stinks, and during his residence in that place he believed that he had breathed more sewer-gas than anyone who resided in a more sanitary country. But on no occasion had he suffered from typhoid and other diseases, which in this country were attributed to the action of sewer-gas *per se*. He had come to the conclusion that there was little evidence that impure water and air were capable of producing such diseases as was said. Whilst in Berlin his bedroom was surrounded by courts, in which were stables, wells, and closets; and the state of the atmosphere in his room was at times such that he could not see. He was also a rigid water drinker, but during his stay there, although he had drunk water undoubtedly polluted, he never suffered from typhoid fever or other diseases attributed to sewer-poison.

Mr. Chadwick said the statistics of Berlin were an answer to Dr. Taylor. In going round the city they would find that the proportions of overcrowding and other conditions with the death-rate corresponded. The results of his examination of the statistics as to Berlin showed that the result was quite in accordance with what was met with everywhere, that insanitary conditions of living raised the death-rates and the prevalence of disease.

Mr. Karkeek expressed his surprise at hearing remarks which implied that sewer-gas and polluted water were not dangerous. He was surprised at Dr. Taylor's remarks, pointing to Berlin as a sanitary city, as his own experience there had been quite the contrary.

The President said that Dr. Taylor did not say that sewer-gas was innocuous, but that he had lived in Berlin, had breathed sewer-gas and drunk polluted water, and was not affected.

Mr. Towle (Oxford) remarked that in Berlin 28,000,000 gallons of water were every day pumped thirty-eight feet high, and flowed into the city. That must cause a lot of dirty water, which was conveyed miles away from the city. That was his system to a certain extent, but by his system they also got rid of the solids. If these 28,000,000 gallons of dirty water could be dispersed over the hills round London, and over the downs, what a benefit it would be! At present the country was being ruined by the sewage being sent into the sea.

Mr. Pengelly (Torquay) agreed that too much was attributed to impure air and water, and not enough to germs of disease, which were liable to be overlooked.

Dr. Carpenter said he agreed with Dr. Taylor that sewer-gas *per se* would not produce specific disease, but where they had bad sewage arrangements they could not have pure health; and they knew that it was in the sewers that the germs of disease were created, and that where the gas went the germs went. If Dr. Taylor was not struck by them, so much the better for him. But in a similar way a man might be in a battle without being hit: the bullets would be

none the less a fact, however. If they had no sewer-gas, there would be no vehicle by which these germs could be conveyed.

Mr. NOURSE, in answer to the question as to the houses in Sussex, said that in 1844 or 1845 they were rebuilt, and that, and the better food which the people were able to obtain, had doubtless much to do with the altered state of things.

Means of Prevention and Cure of Hydrophobia.

The PRESIDENT announced that Dr. Richardson had sent in a translation of a paper, by a French gentleman, on 'A Proposal of Measures for the Prevention of Hydrophobia.' This paper, by M. Decroix, was sent in French. The following is an abstract of the chief points. He starts by observing that every case, or nearly every case, of madness in dogs can be traced to a bite from another dog. Starting from this principle, M. Jean Bourrel has proposed to prevent the disease by cutting or filing dogs' teeth in order to render it impossible for them to bite. Experiments were made by shutting up mad dogs with other dogs in cages, and allowing the former to bite the latter, the skins of which were found lacerated and pierced. The mad dogs then had their teeth filed and cut, and a similar experiment was made. Although the healthy dogs were attacked the skin was not broken. The writer further states that the process of filing and cutting the teeth is neither painful nor unsightly.

In the second part of the paper the writer upholds the tendency of the disease to proceed (at least sometimes) to spontaneous cure; and he recommends that both animals and men afflicted by it should be left alone, and not agitated with attempts at cure, or palliation. The only measure he recommends is the vapour bath.

The Necessity and Importance of Mortuaries for Towns and Villages, with some suggestions for their Establishment and Management.

THE subject of mortuaries is one that has received by far too little attention, not only at the hands of those who are responsible for the practical carrying out of the public health laws of the kingdom, but even of ardent sanitary reformers. Yet it holds, or ought to hold, a prominent place in preventive medicine; and it differs from other sanitary appliances in having an important moral and social office as well as a hygienic one.

To an assembly like this it might perhaps be considered superfluous that I should attempt to show cause why mortuaries are necessary or desirable. Most of us, and especially those whose work has brought them into relations with the poor and the degraded, know what additional terrors death brings with it when it occurs in wretched tenemented property, or in overcrowded cottage homes, where the same room has to act as dead-house, living room, work-room, and not infrequently bedroom. In the poorer parts of our great towns, and, to a lesser degree, perhaps, in country villages, scenes of the most harrowing and saddening description are constantly being enacted through the unavoidable presence of the dead in the midst of the living. Perhaps no more striking demonstration of the need for mortuaries has been made than in the writings of one who is well known to and honoured by all of us—our veteran vice-president, Edwin Chadwick. It is to him that we owe, more than to anyone else, that sanitary awakening which has now become so general and widespread, and of which one of the strongest evidences is the existence and success of this Institute. Mr. Chadwick, to whom had been committed early in the present reign the task of collecting information about the sanitary state of the country, and subsequently as to the practice of interment in towns, wrote as follows in the year 1843[1]; and his words are equally applicable at the present moment:

'In a large proportion of cases in the metropolis, and in some of the manufacturing districts, one room serves for one family of the labouring classes: it is their bedroom, their kitchen, their wash-house, their sitting-room, and their dining-room; and when they do not follow any outdoor occupation, it is frequently their work-room and their shop. In this one room they are born, and live, and sleep, and die, amidst the other inmates. . . .

'It is not a few minutes' look after the last duties are performed

[1] *A Supplementary Report on the Results of a Special Inquiry into the Practice of Interment in Towns.* By Edwin Chadwick. London. W. Clowes & Sons, 1843.

and the body is composed in death and left in repose, that is given to this class of survivors, but the spectacle is protracted hour after hour through the day and night, and day after day, and night after night, thus aggravating the mental pains under varied circumstances and increasing the dangers of permanent bodily injury. The sufferings of the survivors, especially of the widow of the labouring classes, are often protracted to a fatal extent. To the very young children, the greatest danger is of infection in cases of deaths from contagious and infectious disease. To the elder children and members of the family and inmates, the moral evil created by the retention of the body in their presence beyond the short term during which sorrow and depression of spirits may be said to be natural to them is, that familiarity soon succeeds and respect disappears. These consequences are revealed by the frequency of the statements of witnesses, that the deaths of children immediately following, of the same disease of which the parent had died, had been accounted for by 'the doctor,' or the neighbours, in the probability that the child had caught the disease by touching the corpse or the coffin whilst playing about the room in the absence of its mother. The mental effects on the elder children or members of the family, of the retention of the body in the living room day after day, and during meal times, until familiarity is induced—retained as the body commonly is during all this time in the *sordes* of disease, the progress of change and decomposition disfiguring the remains and adding disgust to familiarity—are attested to be of the most demoralising character. Such deaths occur sooner or later in various forms in every poor family; and in neighbourhoods where there are no sanitary regulations, where they are ravaged by epidemics, such scenes are doubly familiar to the whole population.'

The same graphic pen thus writes in the report of the Board of Health on a general scheme for extramural sepulture, published in 1850:—

'The connection between the extinction of the feeling of respect for the dead and the growth of that callousness which renders the brutalised mind insensible to the sacredness of life, and which thus prepares it for the perpetration of crimes of violence of the greatest enormity, has been often traced by those who have had the best opportunity of witnessing the process; and they concur in stating that it is in these filthy, unwholesome, and crowded rooms, where none of the observances of decency are regarded, and where the living, without emotion or concern, eat and drink and sleep in the presence of the dead, not only that the degraded and profligate who constitute the ordinary pests of society are trained, but also that it is out of those same abodes that our great criminals generally come, brutal and reckless men, who every now and then perpetrate in cold blood, with a savage callousness, deeds which fill the whole country with disgust and horror.'

I do not quote any of the instances which Mr. Chadwick cites, on the authority of clergymen and undertakers of that period, of the distressing scenes that they were constantly called upon to witness where a death occurred under conditions that absolutely precluded any separation or screening of the dead from the living. It might be argued that a generation, and the passing of numerous sanitary Acts of Parliament, have worked a revolution in this respect since Mr. Chadwick's glowing words were written. I can confidently affirm, however, from a pretty large experience of the slums of London and of other towns, that scenes not a whit less distressing or heartrending than those described forty years ago are still matters of common experience among our poor and degraded neighbours.

I feel bound, in justification of the position which I have assumed, and in order that I may not seem to be speaking without book, to cull a very few from the large number of instances that have come under my notice in one way or another, pointing to the necessity and importance of mortuaries. They are instances which every health officer, and every one who moves among the poor, could multiply a hundred-fold.

Cases of the kind to which I am referring are constantly occurring in the experience of London coroners, whose evidence on this subject would be of the most instructive and startling kind. The dead body of a woman on whom an inquest was held by Dr. Hardwick in 1876 was kept in a miserable underground kitchen where the family lived; and where, after the work, the family slept and took their food by the side of the corpse until the burial took place.[1]

In a speech made before Mr. Sclater-Booth, in January 1876, Dr. Joseph Rogers cited the following case: An old man died in a house in St. James's let out to lodgers. As it was thought his friends would bury the body, it was allowed to remain several days: indeed, until decomposition had so far advanced as to fill the house with effluvia. The sanitary inspector was then applied to, who, in his turn, applied to the master of the Westminster Workhouse for permission to take the body to the workhouse dead-house. The body was so putrescent that the workhouse attendants had to fill the shell with charcoal ere they dared to take it through the streets.[2]

At a meeting of the West Derby Local Board in March 1876, the sanitary inspector reported that in the course of his duties he had visited a house on the 23rd, and had found the body of a woman who had died on the 19th, lying in one of the rooms which was used as the sleeping-room of the family. The husband stated that as he was too poor to inter the body, he had applied to the relieving officer to have it buried, but the request had been declined by the Board of Guardians. He then went to the clerk to the Local Board, who, after some delay, got an order from a magistrate, and the body was buried six days after death. The husband, who was represented to be given to drink, and indifferent as to whether the body was buried or not, had slept, it was said, in the same bed in which the corpse lay.[3]

The corpse of an unhappy youth at Milton-next-Sittingbourne, who died in a barge from typhoid fever, contracted through drinking

[1] *Sanitary Record*, 1876, vol. iv. p. 162.
[2] *Ibid.* 1876, vol. iv. p. 43.
[3] *Ibid.* 1876, vol. iv. p. 252.

polluted water, was brought to his parents' house through the streets in an open van. On the arrival of the body, the coffin was unscrewed, and remained so for two days before the burial. An outbreak of typhoid fever, confined to the street in which the body lay, subsequently broke out, and may possibly have been due to infection from the corpse.[1]

M. Koechlin-Schwartz recently narrated to a commission of the French Society of Public Medicine—a society which has lately devoted much attention to the subject of mortuaries—a very painful case. In a small room rented by a workman, the father, attacked by small-pox, lay dying on the only bed, and round him, his wife and his five children, without fire or food, were waiting in despair till their turn came to be struck down by the disease. The mother, indeed, was in the anguish of child-birth whilst her husband was *in extremis*.[2]

Quite recently, in fact during the present month, two other glaring cases have been reported in the metropolis, where the great want of public mortuaries is being daily illustrated by the occurrence of cases shocking public decency and detrimental to public health. In one case, in which Mr. Humphreys held an inquest into the cause of the death of a labourer at Mile End, the jury having viewed the body, made, on their return, a complaint to the coroner of the unseemly sight which they had just been obliged to witness. The body lay in a very small and squalid room, in which the relatives, three in number, were sleeping, and had to be aroused before the jury could perform their duty. The foreman justly observed that such a state of things ought not to be permitted to exist in an enlightened country. The coroner's officer explained that there was no public mortuary in the parish of Mile End New Town, or he should have taken the earliest steps to have had the body removed. The coroner could only recommend the foreman to make a representation of the facts in the proper quarter. Dr. Hardwicke, the coroner for Central Middlesex, on the occasion of holding two inquests at the Hampstead Workhouse Infirmary, also called attention to the inconvenience which has long been felt by medical men and others having any connection with inquests at Hampstead, in regard to the want of proper mortuary accommodation. The building at present used for that purpose is the workhouse dead-house, situated at one of the extreme ends of that extensive parish, and is not properly fitted with appliances for post-mortem examinations. Dr. Hardwicke said he had been requested by medical men and others to draw the attention of the jury to this matter. It was thought that the time had arrived when they should make some representation to the parish authorities on this subject. The present mortuary was a place for paupers, and it was not proper that the bodies of those who were not paupers should be taken to it. The medical men engaged, too, had not the proper apparatus with which to do their work. Another grievance was that persons dying in a distant part of that large parish had to be brought to that place. If it were the opinion of the jury that a more central place should be provided, quite apart from the workhouse, he would offer a memorial for them to sign. The jury agreed to this suggestion; and a memorial was drawn up and signed by the jurors and others, and is to be followed by another from the medical men of the parish.[1]

[1] *British Medical Journal*, 1879, vol. ii. p. 663.
[2] *Revue d'Hygiène*, tome ii. p. 41.

One more example, and I have done. There are few amongst those present who do not know the labours amongst the poor of the Rev. Septimus Hansard, the rector of Bethnal Green. On the occasion of the recent opening of a mortuary for his crowded parish in June last, Mr. Hansard said:—

'The use of the building was two-fold—(1) As a mortuary or morgue for the reception of dead bodies, suicides, persons found drowned, nameless corpses, &c. (2) As a mortuary chapel. It was impossible to have been as he had been—for the last 33 years a clergyman among the poor of London—without seeing the necessity for some such building as this, whither the inhabitants of the crowded dwellings of the metropolis might remove their dead, especially in times of epidemics such as cholera, scarlet or typhus fever. He gave three instances of such necessity out of many in his experience. In the time of the cholera, there was one night when nine lay dead of cholera in the houses of the church-close or square near the parish church. The people all sat about in the streets, too frightened to go to bed; and in one place they were burning pots of tar from the windows of the room where a corpse lay. Again, it had in the course of his ministry been his duty to attend two medical men on their death-bed who, in the fearless discharge of their profession, had fallen victims to confluent small-pox. On both occasions the relatives had immediately after death removed the bodies to outhouses. On another occasion he saw, in a room not larger than an ordinary closet, three victims of typhoid lying dead, with five people eating, drinking, sleeping, and living in the same room. Things like this in a professedly religious and Christian country were disgraceful. Here, surely, were proofs of the need of such a mortuary chapel as had just been opened. But not only in case of epidemics would this building be used, but at ordinary times. There were two rooms in the chapel, each capable of containing thirty coffins. One might be set apart for those which required an inquest, or for infectious bodies, the other for those brought thither by sorrowing friends, who could cover the coffin with a pall, and come and take their last look at their beloved ones, surrounded by the emblems of Christian hope. That was why he had desired the building to be called a chapel; not that masses for the dead should be said there, but to throw the sanctity of religion over the building.'

The experience of many of you will furnish other equally striking cases, and I need not, therefore, detain you further with citing more. All sanitarians agree in thinking that in large or crowded towns a properly constructed mortuary is of the first necessity: and there are reasons for thinking that in rural districts also, some provision of the kind would be extremely valuable and save much present scandal. The dwellings of agricultural labourers and their often indecent overcrowding need no description at my hands: and what is to be done in such when a death occurs? Evidently the dead must be left in very unwholesome and distressing proximity to the living in the

[1] *British Medical Journal*, 1880, vol. ii. p. 517.

absence of a mortuary or dead-house, which thus becomes a necessity throughout the country.

Having in this way attempted to place graphically before your minds the horrors and dangers of the dead remaining amongst the living in poor and wretched homes, I would now draw your attention to the remedy, viz. the provision of reception or dead-houses, in which corpses may remain pending interment.

The able and comprehensive report by Mr. Chadwick, to which I have already alluded, may fairly be considered as the starting point, amongst other things, of mortuaries. The report was published in 1843, and evoked much attention and discussion. With the exhaustive report which preceded it, on the sanitary state of the labouring population of Great Britain, it unquestionably paved the way for the passing of the Public Health Act of 1848. In that Act (11 and 12 Vict., cap. 63) there was a section (No. 81) which provided that for the regulation of interments in districts to which that Act applied, Local Boards might provide reception houses for the dead, and make bye-laws with respect to the management of the same, and on application, make arrangements for the interment of any corpse contained therein. This clause was practically superseded by section 27 of the Sanitary Act, 1866, but was not formally repealed until the Consolidating Act of 1875.

The law remained, as regards sanitary authorities, in this state for nearly twenty years, but meanwhile the subject had received a certain amount of attention both at home and abroad. In 1852 there was a general Sanitary Congress at Brussels, and part of the third question for discussion was: 'Of what utility are mortuaries, and for the cases in which their usefulness is recognised, how should they be organised?' I rejoice to find that amongst those who made a firm stand on that occasion for this question being one proper for discussion by the Congress (in opposition to those who would have ignored it, on the ground of its touching questions of religious feelings and family affection) our honoured President, then Lord Ebrington, made himself conspicuous. After discussion, the Congress declared the usefulness of mortuaries in each parish; and, on the motion of Lord Ebrington, resolved that: 'Convinced of the great evils of the keeping of corpses in inhabited rooms, the Congress declares the usefulness and earnestly recommends the establishment of mortuaries.'

Whilst as regards the provision of mortuaries by sanitary authorities no further legislation was attempted until 1866, an important addition to the law was meanwhile made by giving power to the Burial Boards established under the Burial Acts to provide such a building. Thus, section 42 of the Metropolitan Burials Act of 1852 (15 and 16 Vict. c. 85) gave power to any Burial Board, or to the churchwardens and overseers of any metropolitan parish for which a Burial Board had not been appointed under the Act, to 'hire, take on lease, or otherwise to provide fit and proper places in which bodies may be received and taken care of previously to interment, and to make arrangements for the reception and care of the bodies to be deposited therein.'

This power was extended to places beyond the Metropolis by section 7 of the Burials Act of 1853 (16 and 17 Vict. c. 134); to Scotland by section 20 of the Scotch Burials Act of 1855 (18 and 19 Vict. c. 68); and to Ireland by section 23 of the Irish Burials Act of 1856 (19 and 20 Vict. c. 98), now replaced by section 180 of the Public Health Act of 1878 (41 and 42 Vict. c. 52).

The Sanitary Act of 1866 (29 and 30 Vict., c. 90) improved the state of the English law as to mortuaries. By section 27 of this Act 'nuisance authorities' (equivalent to our existing local authorities) were empowered to provide a proper place for the reception of dead bodies, and thereupon a justice, with a medical certificate, might order bodies to be removed to it, and cause removal if the relations failed to obey, charging them with the cost. The authorities were also empowered to provide places for post-mortem examinations (section 28).

The Royal Sanitary Commission, commenting upon section 27, observed that 'although there is this power by law, it appears to be very little exercised, and the evil of keeping the dead in the same room with the living exists very extensively amongst the poor, and this evil is aggravated by the general practice of wakes among the lower classes of the Irish Roman Catholics, who are very numerous in some large towns, such as Liverpool.[1]

The Commissioners suggested that power should be given to the Central Authority to compel a Local Authority to provide a mortuary; and that, even when there was no mortuary, the justice should be enabled, in the cases specified in section 27 of the Sanitary Act, to give an order for the removal of the body from the house. To facilitate the acquisition of parts of closed burial grounds or of land in cemeteries for mortuaries, the Commissioners suggested that the Local Authority should be empowered, in the case of any closed burial ground, to purchase by contract any part of such burial ground from those in whom the site and control were vested, for the purpose of erecting thereon a mortuary, and (if needful) a residence for the keeper. The Commissioners formulated, however, certain provisoes to this transfer, and as these provisoes contain much suggestive matter in a small compass, I give them in full:—

'1. This shall not authorise the purchase of any piece of land if it necessitates the disturbance of bodies already buried.

'2. Nor if the piece to be purchased cannot be approached without passing through any other part of the closed burial ground.

'3. No religious service shall be held or celebrated in any mortuary erected in any closed burial ground.

'4. Such mortuary and residence house (if any) shall be separated by a wall or fence from the rest of the burial ground.'

The Consolidated Public Health Act of 1875, whilst re-enacting the sections of the Act of 1866 as to mortuaries, made their provision by the Local Authority compulsory in cases where the Local Government Board required. The Act of 1875 does not, however, extend to the Metropolis, which, in this respect, is worse off than the country, for the Local Government Board have not the power, even if

[1] *Second Report of the Royal Sanitary Commission*, vol. i. p. 50.

they felt inclined to exercise it, to compel the erection of a mortuary in London. In Scotland legal power is given by section 43 of the Public Health Act of 1867 (30 and 31 Vict. cap. 101) to provide a place for the reception of dead bodies, and to remove bodies to it in certain cases. Nothing is said, however, with regard to post-mortem rooms. In Ireland provisions similar to those in the English Act are contained in sections 157, 158, and 159 of the Public Health (Ireland) Act, 1878 (41 and 42 Vict. c. 52), and there is this important addition: 'The body of any person who has died of any dangerous infectious disease in any hospital or place for the treatment of the sick shall not be removed from such hospital, until removed direct to a mortuary or cemetery, and any person violating, or any officer of an hospital or other person who knowingly permits the violation of this provision, shall be liable to a penalty not exceeding five pounds.'

Seeing the unsatisfactory state of the law, Dr. Joseph Rogers, whose services in connection with sanitary work are well known, and who, some 24 years before, had the principal share in the establishment of the mortuary at St. Anne's, Soho, which was for several years the only one in the Metropolis, moved, in the year 1875, at the Strand Board of Works, that 'With the view of the more effectually and economically securing the establishment of mortuaries in the different parishes of the Metropolis, this Board do memorialise the Metropolitan Board of Works, urging that Board to apply for powers in the next Session of Parliament, authorising that body to undertake their erection in such parts of the Metropolis as may be considered necessary.' The Metropolitan Board declined however to take up the subject, on the grounds that the mortuary question is beset with difficulties in London, and is one which should be dealt with by the Local Boards and not the Metropolitan Board.[1] The Strand Board of Works deemed it necessary, however, to interview the then President of the Local Government Board, for the purpose of securing the aid of his Department in establishing mortuaries in different parts of the Metropolis. A deputation from that body waited upon Mr. Selater-Booth in January 1876, when Dr. Rogers made a lengthy and telling speech in favour of the extension of mortuaries, winding up by formulating the points that should be attended to with reference to the question.[2] These were: '1. That it should be made compulsory on every Local Board to establish a suitable mortuary on a common plan, to be approved of by the Local Government Board or the Metropolitan Board of Works. 2. That these mortuaries should be in the proportion of not less than one to every 50,000 inhabitants. 3. That powers should be provided for the compulsory purchase of property under the provisions of the Lands Clauses Act, and for enabling parishes or portions of parishes favourably situated for such purposes to combine to form mortuary districts; such mortuaries to be maintained at their joint expense, and for their common use. 4. That the Medical Officer of Health, or the Poor-law Medical Officers, or the

[1] *Sanitary Record*, vol. ii., 1875, pp. 165 and 325.
[2] *Ibid.* vol. iv. 1876, p. 44.

Relieving Officer, should be empowered and directed to order the removal of a corpse to the district mortuary in all cases where it was found that the family, at the time of such death, occupied only one room, and in such other instances where it appeared desirable to these officials to direct the same.'

Not much of promise was extracted from Mr. Selater-Booth: but he undertook to confer on the subject with Mr. Cross, who as Home Secretary had more control over the Vestries than the Local Government Board had. In the ill-fated Public Health (Metropolis) Bill of 1877, which Mr. Selater-Booth introduced with the view of making the public health law uniform for the metropolis and country, clauses were inserted re-enacting the clauses in the Sanitary Act, 1866, bearing on the question, but making the provision of a mortuary compulsory, if the Local Government Board so directed. The fate of this Bill is, however, well known; and we are now in the Metropolis almost as badly off as ever, certainly as badly off for any reasonable system of disposing of the dead pending interment. I think, therefore, that this is a subject which is eminently worthy of the attention of the Sanitary Institute, and I would suggest for consideration, whether it might not be expedient and useful for the Institute to take up the question where it was left in 1876, and endeavour to induce the new Government to make a move with regard to this important branch of public health machinery.

I now come to the second part of my paper, and proceed to offer some suggestions for the establishment and management of mortuaries.

I must premise that these suggestions are not intended to exhaust the subject. They are suggestive merely, and are offered in the hope that they may help to a better understanding of a question on which far too little is known. Not the least of my difficulties in approaching this subject has been the extreme paucity of the information given about it by standard authorities.[1] The word mortuary hardly occurs in the index to any book on Hygiene with which I am familiar. I have therefore had to rely very much upon the facts which I have been able to pick up in the course of my reading, and upon my practical experience of the requirements of such erections.[2]

It may be, and has been, urged against the erection of mortuaries, that even if they were established, poor people would with difficulty be got to allow their dead to be taken there. The law recognizes this difficulty, and section 142 of the Public Health Act provides that 'when the body of one who has died of any infectious disease is

[1] *Sanitary Record*, January 15, 1876, p. 44.
[2] For much valuable information showing the need for mortuaries, reference may be made to Mr. Chadwick's *Report on the Practice of Interment in Towns* (Clowes, 1843), and to the Report of the General Board of Health *On a General Scheme for Extramural Sepulture* (Clowes, 1850). Dictionary articles on the subject will be found in Tardieu's *Dictionnaire d'Hygiene*, article 'Morgue' (Baillière, Paris, 1862), Wynter Blyth's *Dictionary of Hygiene*, article 'Mortuary' (Griffin, London, 1876); and Pappenheim's *Handbuch der Sanitäts-Polizei*, article 'Leichen-polizei' (Hirschwald, Berlin, 1870). In the second edition of the writer's book on *Cottage Hospitals* (Churchill, 1880), an attempt has been made to deal with the question of mortuaries, more particularly from the point of view of their relation with hospitals.

detained in a room in which persons live or sleep, or any dead body which is in such a state as to endanger the health of the inmates of the same house or room, is retained in such house or room, any justice may, on a certificate signed by a legally qualified medical practitioner, order the body to be removed at the cost of the Local Authority, to any mortuary provided by such authority, and direct the same to be buried within a time to be limited in such order.' This section, it will be observed, is of very wide application; for it cannot be doubted that many dead bodies, not necessarily those of persons dying of an infectious disease, are in such a state as to endanger the health of the living inmates of the house or room in which the bodies are retained. Yet, unless a mortuary is provided, there is no legal power to deal with the body, and it may remain a source of the gravest injury to the public health of the neighbourhood. The establishment of a mortuary is then an imperative duty for Local Authorities throughout the kingdom.

Mortuaries have been provided in this country in a great variety of ways. There are first of all the separate erections, with post-mortem room and coroner's court, such as the mortuaries in the City of London, at Islington, Clerkenwell, and in some of our large towns. There are the mortuaries provided by sanitary authorities in connection with infectious hospitals that they have established. There are the mortuaries provided at cemeteries or on licensed burial grounds. And there are the mortuaries, if such they can always be called, provided at general hospitals for the bodies of persons dying in the institution, but rarely thrown open to the outside public. Of the latter I do not intend to speak. These are not public mortuaries in any real sense of the word. They are simply furnished for the convenience and use of the hospital authorities and for post-mortem purposes, and are intended in addition for the purpose of keeping the corpses out of the wards until the time comes for burial. Indeed, it may safely be said that no mortuaries in any comprehensive sense of the word exist at hospitals.

Of mortuaries proper, all sorts and sizes exist, from the elaborate erection provided at a cost of 12,000*l.*, by the City Commissioners of Sewers, in Golden Lane, comprising a mortuary chapel, with twelve slate tables, keeper's house and offices, coroner's court, laboratory, weighing room, consulting room, dead-house fitted for post-mortem examinations, disinfecting apparatus, ambulance shed, and shed for disinfecting apparatus, down to the old parish dead-house or pest-house, which has in some places been utilised for the purpose, and is almost, if not quite, destitute of all furniture.

One of these pest-houses is to be found at Greenwich, where it stands in the churchyard, to the disgrace of the local health authority.

I do not propose, in fact it would be impossible for me, to attempt to give any sort of description of the mortuaries which at present exist. They are too various in establishment, size, arrangement, regulation, and management, to admit of any sort of classification; and I have therefore contented myself with giving in an Appendix the names, and all procurable particulars of those mortuaries of which

I have been able to learn the existence. I am conscious how extremely defective this list is, and I shall be greatly obliged for any further names and particulars with which I may be favoured.

I proceed then at once to sketch out certain requirements of a mortuary, as regards its establishment, situation, and regulation.

And first, as to its *establishment*. I have already mentioned in a former section that, under the Public Health Act of 1875, any Local Authority may, and, if required by the Local Government Board shall, provide a mortuary, and may make bye-laws with respect to the management and charges for its use. They may provide for the decent and economical interment of any dead body received into a mortuary (Section 141). To this mortuary, a justice may, in certain cases, order the removal of a dead body (Section 142). The Local Authority may also provide a place for post-mortem examinations ('otherwise than at a workhouse or a mortuary') (Section 143). Thus it is to local sanitary authorities that we must mainly look for the establishment of these temporary resting-places for the dead. But it has struck me that when the Local Authority is unwilling to perform this necessary duty, or has difficulty,—which I know to be sometimes a real difficulty,—in procuring a suitable site, that then another method might, in places where there is a hospital, be devised for securing the establishment of a mortuary. Most hospitals make some sort of provision for deaths occurring within their walls; and I think that if sanitary authorities felt disposed to help, hospital managers would often be found willing to erect a somewhat more pretentious mortuary than they would otherwise have done, and to throw it open, under certain regulations, to the general public. The rapid extension of cottage hospitals leads one to hope that this method of securing mortuaries would satisfy the demands of a large and increasing number of places. It is a common practice for Local Authorities to subscribe to hospitals,—especially to infectious hospitals,—provided by private enterprise; and I am not aware of any legal objection to the same power of subscription being exercised in the case of mortuaries. Indeed, the utility of a mortuary is usually more obvious to Local Authorities than that of a hospital, so that probably this plan has only to be suggested to secure adhesion to it.

Another method in which mortuaries—especially on the continent—are provided, is to erect them in *cemeteries*. There is much to recommend this plan, both on the score of economy and of regard for the public health, so long as the cemetery is within reasonable distance of the district for which the mortuary is to serve. Such mortuaries are of course provided by Burial Boards, who need not be, and as a rule are not, the sanitary authority of the place. In this connection, it may be worth while to observe that, whilst section 142 of the Public Health Act grants the power of compulsory removal of dead bodies to a mortuary provided by a sanitary authority, it does not do the same in the case of a mortuary provided by a Burial Board. This seems a very absurd and unnecessary restriction, and may be commended to the attention of our legislators. In addition to the advantage of freer space and cheaper administration,—for the cemetery-keeper could be instructed to supervise the mortuary as part of his

duties,—mortuaries at cemeteries enable the corpse to be taken direct to the grave, without the necessity of a hearse and its attendant expenses. At the mortuary established by the Hampstead Burial Board at their cemetery at Fortune Green, there is a wholesome rule requiring that, in the case of persons dying of infectious disease whose corpses are received into the mortuary, the friends must meet the corpse at the cemetery, and not at the mortuary, from which the body is carried direct to the grave. For ordinary cases of death, it would be well to have a separate waiting-room provided for the mourners to assemble in on the day of burial, as is done at the mortuary in Dean Street, Soho. Seeing, then, the obvious advantages of mortuaries at cemeteries, it may be worth consideration whether, in the establishment of all new cemeteries, provision should not be made in the plans for a building, of the nature of a mortuary, to receive dead bodies pending interment. On this point, the evidence of the late Mr. Robert Baker, one of Her Majesty's Chief Inspectors of Factories, is peculiarly valuable. When examined before the Royal Sanitary Commission, on January 17, 1870,[1] Mr. Baker said that he 'wished strongly to express that he thought at every cemetery there should be a mortuary for from one to fifty bodies, with locks and keys, the numbers of the cells and keys to correspond: and he thought it would be desirable, in non-contagious deaths, that the bodies of the poor should be conveyed, soon after death, to these mortuaries, and, if the people were needy, at the public expense; and the key should be given up to the relatives to the time of interment, which should be fixed, in order to avoid offence in the summer time' (Q. 9407). Asked whether he would make the removal optional in non-contagious diseases, and compulsory in the case of contagious diseases, he answered in the affirmative; and he thought that 'in case of contagious diseases, it should be compulsory to have the body placed within a shell, within a coffin (if it be desirable that it should be kept for the arrival of friends), between which and the shell there should be an interstice of pitch; the lid of the shell being also pitched on, but with a glass over the face' (Q. 9408). The expense of such removal Mr. Baker would, in the case of poverty, throw upon the parish.[2]

We have next to consider the question of *situation*. Whenever possible, the mortuary should of course be separated by a belt of air from all dwelling-houses; but no injury has been found to follow the use of those in very crowded neighbourhoods, even when they abut on the street. The mortuary in Drury Lane, the walls of which are brought up flush with the pavement, is an instance of this. The

[1] *Second Report of the Royal Sanitary Commission*, vol. iii. Part I. p. 53.

[2] Mr. Thomas Baker, in his standard work on *The Laws Relating to Burials* (Maxwell & Son, 1873), remarks, on page 304 of the fourth edition:—'In some of the more recently erected cemetery-chapels an arrangement has been made which might serve some of the purposes of places for the temporary reception of the dead before burial as well as their chief object, that of protecting the mourners attending the funeral services from annoying or dangerous emanations from the dead. In these chapels a portion has been divided off from the main building by a glass screen, which completely separates the part in which the coffins are placed from that occupied by the mourners, and it is easy to make this separated portion large enough to hold several coffins, where they might remain without danger until preparation is made for the funeral.'

Drury Lane mortuary, like a great many others in the Metropolis, has been built on an old disused burial ground; and certainly these spaces, occurring as they do in crowded localities, afford a very convenient site for mortuaries, a site, too, which the ordinary prejudices of people against the establishment of receptacles for the dead in their midst can hardly reach.

Wherever possible a mortuary should be screened from the road by trees or shrubs, and should be approached by a winding path also planted with shrubs.

The *internal arrangements and fittings* are most important. There should be ample means of ventilation provided for every part of the building; and the mortuary, though not made too bright by window space, should not be gloomy or depressing in appearance.

Though, of course, a mortuary proper would consist merely of a dead-house, it is very desirable, and indeed essential, that connected with it should be a *room for post-mortem examinations*, and another for the holding of *coroners' inquests*. For it must be remembered that a certain, and in some cases not inconsiderable, portion of the bodies brought into a mortuary will be for identification and legal inquiry—as of persons found drowned, or dead in the streets, murders, suspected suicides, unknown strangers at hotels, &c., &c., and suitable provision must therefore be made not only for a skilled medical examination of the body to discover the cause of death, but also for the coroner and jury to hold inquests on the bodies.

The most objectionable and undignified custom of holding inquests at inns and taverns,—not unfrequently amidst the noise and bustle of business in a low neighbourhood,—hardly needs condemnation at my hands. It has been satirised by several of our great writers, foremost amongst them being Dickens, whose vivid word-picture of the coroner's inquest in 'Bleak House' is doubtless familiar to you all. If all mortuaries had a room fitted up as a coroner's court, the present indecency of inquests might to a large extent be done away with.

The *size* of the mortuary room proper must, of course, be large, and will depend upon the population of the district for which it is to serve. Space for some twelve bodies has been held by Dr. Hardwicke, the able and energetic coroner for Central Middlesex, to be quite sufficient for a large town. The bodies may be placed in shells or coffins resting either upon tables covered with zinc or other impermeable material, or upon trestles, or upon moveable iron brackets fixed round the walls. At some of the London hospitals, catacombs the size of the coffin, and made of slate or brickwork, are used; and for certain purposes these may be found useful.[1] Since some of the bodies are certain to be brought in an advanced stage of decomposition, a stock of charcoal and disinfectants should be kept. Any good disinfectant may be employed, but as the chlorides act most powerfully in preventing decomposition, it would, perhaps, be preferable

[1] In certain cities of the Continent there are mortuary chambers in the form of separate cells completely isolated, in which it is contemplated that families can mourn and watch their dead until the time comes for interment. These, as being wholly religious structures, I do not propose to deal with.

to use them. If carbolic acid be employed, a strong solution must be used. If the dead are in an advanced state of decomposition before they are received, they should be surrounded with sawdust and carbolic acid powder before being screwed down, to prevent annoyance and injury to health. Cloths for covering the dead, which should be frequently saturated with disinfectants, should be provided.

It is important that the mortuary should have in readiness some *shells or coffins* for the holding of corpses whilst a proper coffin is being prepared. It has been suggested that the person desiring to make use of the mortuary should provide these: but experience teaches—as indeed was to be expected—that it is far preferable for the managers of mortuaries themselves to have on hand a few such shells, which can be sent from the mortuary to the place from which the body has to be removed. The Islington Vestry, having experienced difficulties in the use of their admirable mortuary with regard to this question of shells, ordered some of different sizes, made of wood and lined with tinned copper, to be kept at the mortuary for use when required. These are cleansed by the mortuary keeper after each occasion of use. A good rule at this mortuary is that no wooden shells may be removed therefrom except when used to bury in. If a body be transferred from it to a coffin for burial, the shell is sprinkled with disinfectants, split up and burned. At Clerkenwell, the City, and Drury Lane mortuaries, there are also shells belonging to the authorities in readiness for similar emergencies. At every mortuary there ought to be at least one or two air-tight coffins with glass lids for convenience of viewing the bodies on which inquests are held—an oftentimes very distressing and disgusting ceremony for the jurors. Or a well-made movable case with glass on the top might be provided for placing over bodies on which inquests are to be held. The glass should be fixed in a frame hung on hinges, so as to admit of the free use of disinfectants after the case has been placed over the body.

The *post-mortem room* may adjoin, but should be quite distinct from, the mortuary. This separation is needful in order to comply with the terms of section 143 of the Public Health Act, which, whilst giving powers for the erection of post-mortem rooms, distinctly requires that they must be provided 'other than at a workhouse or a mortuary.' Mr. Lumley, in his comments upon this section, observes that 'This exception deserves special attention. It is desired that places should be provided for the removal of dead bodies from the rooms of poor people when they die, and it would create a repugnance on the part of the relatives to such removal in many cases, if a suspicion arose that such bodies might be subject to anatomical examination.[1] This, no doubt, is the feeling which has prompted the legislature to make so positive a prohibition. It is only necessary, however, to take care that the post-mortem room is distinct from the mortuary (*i.e.* that it is walled off from it, has a separate entrance, and is cut off from it in other ways), to comply with the Act of Parliament.

[1] *The Public Health Act*, 1875, *Annotated*. By W. G. Lumley, LL.M., Q.C. (Shaw & Sons, 1876), p. 115.

As to the fittings of the post-mortem room, I cannot do better than quote from a paper on the subject of mortuaries which was read before this Institute at its Stafford meeting in 1878, by Dr. Hardwicke, whose very large experience gives to his utterances peculiar value. Dr. Hardwicke recommends that 'the post-mortem room should be used only for the uncoffined or unclaimed bodies awaiting identification, and ought to be kept cool in summer by a supply of cold water; the corpse having sometimes to be preserved as long a time as possible from decomposition. This room should be furnished with special appliances necessary for post-mortem examinations; a marble or slate slab, with sides sloping towards the centre, converging into a drain below, so that fluids may not run over the edges; a sink with a plentiful supply of cold water; an iron bowl; a coarse sponge; a jack towel; a wooden yard measure; and, for the weighing of organs and structures, a set of weights and scales; a slated footboard around the slate table, on which medical men making post-mortem examinations may stand free from the damp or cold floor. Gas should be laid on, so as to procure warm water, or as it may be found necessary to make the examination at night, or when the darkness of winter days may obscure the view of the subject.'

A great deal of the success of a mortuary depends upon the efficiency of its *keeper*. The appointment of such an officer is absolutely necessary if scandal is to be avoided; but as to the amount of work to be required of him, everything must depend on the circumstances of the case. In mortuaries at cemeteries, the cemetery-keeper may properly supervise the mortuary; in mortuaries at hospitals, the porter or gardener: but as to mortuaries standing by themselves, no rule can be laid down. The duties, however, of the keeper have been thus defined by Dr. Hardwicke in the paper already quoted:—

'His duties would be to receive under his charge not only bodies brought in by relatives and friends of the deceased, but those found dead by the police, or from accidents, or cases sent to the mortuary by the coroner's officer to await an inquest, or by the medical officer or sanitary inspector of the district, in order to relieve an overcrowded dwelling of a corpse dying from an infectious disease, or in a state of dangerous decomposition. He must act under fixed rules, and become responsible for the safe custody of these bodies and such articles of clothing as may accompany them. He must attend to the proper cleansing, disinfecting, and ventilation of the rooms generally, but especially of that used for *post-mortem* examinations and the room used for the reception of a corpse dead from an infectious disease. He must render some assistance to medical men who are called to make post-mortem examinations, in the placing of the corpse in and out of the shell; and his attendance is required upon persons visiting either for the purpose of identification or seeking information relative thereto. It is of the utmost importance that a mortuary keeper should live very near the mortuary, so that he may always be ready at all times to receive bodies. He should also keep a register of the mortuary, containing the date, name, sex, age, address, and other circumstances appertaining to the bodies to be removed;

such as by whom, where to, or to what cemetery, or by what undertaker.[1]

The next point to consider is the *regulation of mortuaries*. As to this it seems to be generally agreed that the fewer regulations there are the better. Restrictions or forms of recommendation only tend to lessen the usefulness of mortuaries, and the best plan is to throw them open to every one who chooses to send a corpse thither. Dr. Letheby, in 1871, drew up an elaborate set of rules for the City Mortuary, but practically these have now fallen into complete desuetude. The subjoined rules, which are in force at the mortuary provided by the Islington Vestry in the Chapel of Ease grounds, Holloway Road, will be found to contain all that is essential in the matter:—

'The dead body shall be enclosed in a proper shell or coffin, such being the shell or coffin in which the body is to be buried, and shall be conveyed to the mortuary chamber, and also removed therefrom in a hearse, or otherwise in a decent and proper manner, and the undertaker or friend shall remove the dead body for interment within an ordinary specified time.

'In case the undertaker or friend fail to remove the dead body within the time specified, notice shall be given to the relieving officer of the parish to bury such body at the expense of the poor rate, such expense being subsequently recoverable from the parties legally responsible.

'A body having been brought or sent by any person whatsoever to the mortuary in a shell or coffin, such shell or coffin shall, under no circumstances, be removed other than for the burial of the body contained therein, unless such shell or coffin with the lid be properly lined with tinned copper.

'Should any shell or coffin sent with a body prove to be in a defective condition, a thoroughly sound and larger shell must upon notice be supplied, in which the defective shell can be enclosed, or in default the sanitary superintendent shall order a proper shell to be provided, and the expense will be recovered from the party sending such defective coffin.'

As to the *reception of cases*, there is a useful rule at the mortuary at Dean Street, Soho (which is under the control of the Burial Board of St. Anne, Westminster), empowering the attendant to receive a body without an order (otherwise necessary from a member of the Burial Board), if it be accompanied by a policeman or known inhabitant. At the mortuary in Drury Lane, which was established some years ago by Lady Burdett Coutts, Lord Vernon, and other benevolent persons, on the disused burial ground of the parish of St. Martin-in-the-Fields, there is a rule forbidding the admission of any public procession or large assemblage of persons into the grounds on the occasion of the admission or removal of the body. Only the immediate relatives, the undertakers, and bearers are allowed on the premises,—a commendable rule, which deserves imitation.

[1] The scheme of duties for the keeper drawn up in 1871 by the late Dr. Letheby for the City Mortuary, or the Islington rules based upon it, may be recommended for general adoption.

At this last mortuary bodies are received from 8 A.M. to 8 P.M from September 1 to April 30, and from 8 A.M. to 10 P.M. from May 1 to August 31. Practically it would be found best to impose no limitation on the *hours when bodies are to be received*, as it may often happen, especially during epidemic periods, that it is essential that the body of a person dead of infectious disease should be removed instantly. It might be well, however, to have a general understanding on the subject, as at the City Mortuary, where all bodies are systematically removed by 11 P.M., though there are no specified hours named.

No *charge* should be levied on the relatives of the persons whose bodies are deposited in the mortuary, as it is very important to encourage its use as much as possible. At none of the mortuaries of which I have information is such a charge made. The expenses of inquests held at the mortuary would of course be paid by the coroner.

The *visits of friends and relatives* need a word of mention. In most of the mortuaries that I am acquainted with there is no limitation to the unrestricted visits of friends within reasonable hours. At the Drury Lane mortuary the number of persons is restricted to three, between the hours of nine in the morning and sunset; and at Hackney, where two mortuary chambers (one for accidents and non-infectious diseases, and the other for infectious cases) have been provided, no one is allowed in the infectious disease chamber. At this mortuary infectious corpses are wrapped up in a sheet soaked with carbolic acid and water, and are placed in a shell when they arrive, if they are not brought in one. They are then transferred, as soon as possible, to a coffin in which sawdust and carbolic acid have been put, and the coffin is screwed down.

This leads me to the question whether or not it is necessary in providing mortuaries to have a *separate chamber for infectious cases*. I do not think that this separation will usually be found necessary, though, of course, there is an additional precaution when it is done. All infectious corpses ought certainly to be dealt with as at Hackney, and should be screwed down as soon as possible, a piece of glass being let into the lid of the coffin in cases where it may be considered expedient or may be desired by the relatives. The question whether it should not be compulsory, without the necessity and uncertainty of applying to a justice, to send infectious corpses to mortuaries from houses where proper isolation cannot be observed, is one upon which I can hardly express a decided opinion. It appears to me, however, to be eminently desirable from a sanitary point of view, and to offer hope of helping to diminish our yearly death-roll from preventable disease.

The public ought to have *easy access* to mortuaries, and every reasonable facility should be offered them for so doing. In those cases in which the body of a person is found drowned, or is unknown or in other ways undistinguishable, provision should be made so that all the clothes of the deceased may be exposed to view. At present it is by no means easy for people who desire to view the bodies of unknown persons to accomplish their desire; and the natural consequence is that they come not to care to do so. The number of persons annually consigned to mother earth whose names and stations in life are utterly unknown is very large; and it cannot be doubted

that if more easy means of identification were provided, as by the exhibition of their clothes, we might reduce the number to an appreciable extent. Moreover, in this manner foul play might more readily be detected, and mysterious disappearances cleared up. When it is borne in mind that of the three or four hundred persons annually exposed at the Morgue in Paris, half the identifications are due to chance; and that since greater facilities for the entry of the public to that institution have been made, the identifications have increased from barely three in every four bodies to nearly eight in nine, and that the police have been greatly assisted in the detection of crime, the importance of reasonably free access to a public mortuary will be recognised. I must guard myself against being supposed to advocate the setting up in England of an institution like the Morgue, for the sensational sights exposed to public view in that building are clearly very undesirable. It is, nevertheless, of great importance to allow such free access as may help to assist in clearing up a mystery or may lead to the detection of a crime. Of course, the gratification of mere morbid curiosity must be strongly discouraged, but it would not be at all difficult to do this with proper regulations. Many of the identifications at the Morgue, which is the most complete institution of its kind extant, are made through the clothes of the deceased being conspicuously exposed; and the importance of preserving all articles of dress worn by an unrecognised corpse must therefore be strongly insisted on. At the Morgue a special room is provided for the retention of clothes of the unrecognised dead for from six to eight months after burial; but the number of deaths of persons unknown is likely to be so small at ordinary mortuaries that a box or press would be quite sufficient for the purpose.

I should wish, in conclusion, to say a few words as to the *burial arrangements* to be made by the managers of mortuaries. The length of time that should elapse between the reception of the body and the burial is of some importance; and it will be observed that the justice's order referred to in section 142 of the Public Health Act may direct a body 'to be buried within a time to be limited in such order.' It becomes, therefore, of moment to know what should be the maximum time allowed. In England we have no power of requiring burial within a fixed period from death, though it is eminently desirable that we should have this power. It may not, perhaps, be generally known that in a Bill of 1842 there was a clause which proposed to provide that 'from and after the first day of October, one thousand eight hundred and forty ——, if any dead body shall continue unburied between the first day of May and the thirty-first day of October, both days inclusive, more than —— hours, or between the first day of November and the thirtieth day of April, both days inclusive, more than —— hours, the executors or administrators to the estate and effects of such deceased person, or the friends or relatives of the same, or any one of such friends or relatives present at the burial, or the occupier of the house from which such dead body shall be removed to be buried, shall forfeit the sum of twenty shillings for every twenty-four hours after the expiration of such respective periods.'

Nothing, however, came of this, and I do not think the question has again been raised. On the Continent, however, and in America, the state of affairs is different. Thus the New York Board of Health, whose sanitary regulations are extremely full and careful, have ordered that 'no person shall retain, or allow to be retained unburied, the dead body of any human being for a longer time than four days after the death of such person, without a permit from the department, which permit shall specify the length of time during which such body may be retained unburied.' It would seem, therefore, wise to take this standard, and make regulations to the effect that a body must be removed from the mortuary within four days of the death. At Drury Lane every corpse must be removed for interment within six days from the date on which the death occurred. Corpses of persons dead of cholera must, however, be removed within two days, and those dead of other dangerous infectious diseases within three days, power being reserved to the Medical Officer of Health to order the interment of a rapidly decomposing corpse at any time.

As to the actual *arrangements for interments*, not much needs to be said. The portion of the Act dealing with this matter is not particularly clear, but Mr. Lumley, in his comments upon it, seems to think that the interment of bodies from a mortuary should, when necessary, be performed by the Sanitary Authority. In practice, however, burials from a mortuary that are not paid for by the relatives are performed by the Poor Law Authority, *i.e.* the Guardians. So far as I know, no legal question has yet arisen as to the interpretation of this clause; and probably it would be better not to disturb the existing arrangements.

In thus endeavouring to give consideration to the subject of mortuaries in its various aspects, I fear I have been unduly prolix; but as no one else has yet grappled with the question in the fashion that I have attempted to do, I have thought it desirable to place on record the facts that I have been able to gather together on this important subject, in the hope that they may be of assistance to those who are striving to provide for the establishment of mortuaries in their midst. I am convinced that there is no subject more worthy of the attention of the clergyman, the philanthropist, and the sanitarian than that upon which your indulgence has permitted me thus to descant.

HENRY C. BURDETT.

APPENDIX.

LIST OF MORTUARIES.

A. METROPOLIS.

In 1875 the *British Medical Journal* took measures for ascertaining the actual amount of mortuary accommodation existing in the Metropolis (see the No. for December 25, 1875, page 802). Since then certain other mortuaries have been constructed, but extensive districts in London are still without such a building. Of the following the author has particulars:—

BATTERSEA.—A mortuary 'projected,' for six bodies, with post-mortem room (A.D. 1875).

BERMONDSEY.—Mortuary, with a post-mortem room.

BETHNAL GREEN.—A handsome mortuary chapel was opened in June 1880 in the disused churchyard of St. Matthew's, Bethnal Green. It was built at a total cost, including the excavation of the site and the removing and re-interring the bodies, of 1,522*l*. The building contains two mortuary chambers, one for ordinary uses and the other for the reception of infectious cases. Each chamber is 16 feet square, and the height from the floor to the apex of the roof is 23½ feet. The two chambers provide accommodation for forty bodies. The material used is brick, with dressings of Portland stone; the floors are finished with patent Victoria stone. The whole of the exposed woodwork in the interior of the building is of pitch pine stained and varnished; the interior walls are finished with Keene's cement and painted. The shelves in the mortuary chambers are of thick slate slabs carried on iron cantilevers, and great care has been taken throughout to keep everything as flat as possible, and to avoid ledges and projecting mouldings, so as to prevent lodgment of dust and dirt, and so that the whole of the interior can be thoroughly cleansed without difficulty. The post-mortem table is constructed of wood, with a leaden top, so arranged as to drain towards the centre. In one corner of the post-mortem room is a large sink with water supply, and a hose-pipe is provided, so that everything can be washed down without delay or inconvenience; the room also contains a large gas-heated boiler, so arranged that hot water can be obtained in a few minutes, and gas is laid on throughout the whole building.—*British Medical Journal*, vol. ii., 1880, page 517.

CITY OF LONDON.—Mortuary provided in 1871, by Commissioners of Sewers, from plans by Colonel Haywood, C.E. Buildings include (1) mortuary chapel, with 12 slate tables; (2) keeper's house and office; (3) coroner's court, &c.; (4) laboratory; (5) weighing-room; (6) consulting room; (7) dead room, fitted up for post-mortem examinations; (8) disinfecting apparatus, &c.; (9) ambulance shed; (10) shed for disinfected clothing. The buildings were erected in Golden Lane at a cost of 12,000*l*.

CLERKENWELL.—Mortuary at Spa Fields Burial Ground, including coroner's court, post-mortem room, disinfecting oven, and all necessary appliances. Cost 2,500*l*.

FULHAM.—A mortuary at Fulham Cemetery. Another at workhouse, which District Board has permission to use.

HACKNEY.—Two rooms—one for the reception of accident cases, the other for infectious cases. Floor of the latter of stone, and kept watered with solution of carbolic acid.

HAMPSTEAD.—Mortuary belonging to Burial Board at Fortune Green Cemetery. The medical officer of health has expressed his regret that 'it is not more used and better valued.'

HOLBORN.—Mortuary 'in construction' for 12 bodies in 1875.

ISLINGTON.—Mortuary in Chapel of Ease grounds, Holloway Road, with coroner's court, two waiting rooms, a post-mortem room provided with water, and two mortuaries—one for infectious cases. Reported to be very useful.

KENSINGTON.—Plans prepared by architect of Vestry, and agreement made with churchwardens settling the conditions on which a mortuary may be erected in the disused parish churchyard.

LAMBETH.—Mortuary for 12 bodies, with post-mortem room.

LEWISHAM.—A small building with lean-to roof, to hold 4 or 5 bodies. Has a post-mortem room.

MARYLEBONE.—Mortuary and post-mortem room; but nearly two miles apart. No coroner's court.

MILE END OLD TOWN.—Mortuary, 'replete with improvements.'

POPLAR.—Mortuary for 40 bodies. No post-mortem room.

ST. ANNE'S, WESTMINSTER.—Mortuary established at Dean Street, Soho,

under the control of the Burial Board of St. Anne's, Westminster. The first of its kind in London. Under the superintendence of a resident attendant. It adjoins the parish church. Friends of a deceased person can at all times have access thereto, and a separate room is provided for mourners to assemble in on the day of burial. No fee or charge whatever allowed.

ST. JAMES'S, PICCADILLY.—Mortuary at Dufour's Place, Broad Street, Golden Square.

ST. LUKE'S.—Accommodation building (1875) for 12 bodies.

ST. MARY, NEWINGTON.—A railway arch adapted for purpose; also post-mortem room.

ST. SAVIOUR'S.—For 3 bodies; also post-mortem room.

SHOREDITCH.—A mortuary on ground adjoining the church. Glass coffins for recognition of unknown dead, disinfecting apparatus, and suitable means and conveniences for conducting post-mortem examinations.

STRAND BOARD OF WORKS.—Mortuary in Drury Lane, provided by private benevolence on the old disused burial ground of St. Martin's-in-the-Fields. Well constructed and very useful.

TOTTENHAM.—The Medical Officer of Health chronicles in his annual Report for 1879 the decision of the Local Board to establish a mortuary.

B. PROVINCES.

BIRMINGHAM.—Five mortuaries, the last opened recently. All in connection with police stations. Bodies received are mostly those of persons who have come to a sudden or violent death. In 1879, 79 bodies were received.

BRISTOL.—A mortuary chamber at the cemetery.

DARLINGTON.—A mortuary in the corner of the site of the Fever Hospital, fitted up so as to serve also as a post-mortem room.

DERBY.—Mortuary erected in 1879. Inquest cases only have, up to the present, been received.

DUBLIN.—'Until the year 1871, the only provision for receiving remains awaiting inquests, or for making post-mortem examinations, was a shed connected with a dairy yard. The means for removing such remains for interment were equally defective and discreditable, and in 1871 the Public Health Committee undertook the erection of a morgue, mortuary-house, and coroner's court, which, at a cost of about 1,200*l*., were completed in 1872. The number of remains annually deposited in the morgue has averaged 93. In the accommodation afforded by this establishment, and in the arrangements made for giving effect to its objects, it is considered to be inferior to no other in the Kingdom.'—*Evidence of Mr. James Boyle, before the Dublin Royal Sanitary Commission*, Q. 3708.

EXETER.—Mortuary at cemetery.

GATESHEAD.—Provision of mortuary and post-mortem examination resolved upon (1879).

LIVERPOOL.—In his annual report for 1879, Dr. Stopford Taylor states that 'During the year, 66 bodies were, by order of the justices on the certificate of the medical officer, removed to the mortuaries provided by the council under section 142 of the Public Health Act.'

MANCHESTER.—A mortuary chamber in the interior of the town for special cases of infectious diseases.

NEWCASTLE-ON-TYNE.—There is a mortuary here, but it is evidently not used as it ought to be. The Medical Officer of Health, in his report for 1879, says that during that year nine bodies were removed to the mortuary by the sanitary authority on account of relieving officers declining to give orders for interment unless this were previously done. There appears to be

considerable irregularity in the method of procedure adopted, most of the bodies thus dealt with have been such as did not strictly come within the meaning of Section 142 of the Public Health Act. The bodies seem to have been removed solely to prevent the poor-law authority from being imposed upon.

SALFORD.—A 'commodious mortuary, with charcoal ventilators and every modern improvement,' has been provided within the enclosure of the Wilton Fever Hospital. The Medical Officer of Health reports that 'the building is a large one, and its ventilating and disinfecting arrangements are such as to allow of a corpse being retained in it for a reasonable time, without giving rise to perceptible nuisance.' He adds: 'The building will be available for post-mortem examinations by order of the coroner or otherwise, and the conveniences which exist in connection with the mortuary will very considerably conduce to the comfort of those who have to make the autopsies.'

SCARBOROUGH.—Two mortuaries, one constructed by the Corporation on their own premises, the other at the cemetery. The first is substantially built of brick, and is fitted up for post-mortem examinations. It is used for the reception of the drowned, and of tramps dying in common lodging-houses. The second is intended for the reception of coffins pending interment, and has been found very useful.

SIDMOUTH.—A receiving-house has been erected in connection with one of the chapels of the new cemetery, in readiness for the immediate reception of bodies until burial, in case of infection or otherwise. The Medical Officer of Health reports that thus far it has not been needed.

SUNDERLAND.—The health officer, Dr. Yeld, says, in his annual report for 1879, 'The mortuaries [? number] belonging to the Corporation have been carefully attended to, and during the year a supply of water has been laid on to each. With one exception, all the bodies removed to these buildings were those of persons found drowned, or who had met with a violent or sudden death. Dead bodies arriving at the port on board ship are removed to the Sunderland Mortuary at the foot of Coronation Street.' There is also a mortuary at the Fever Hospital.

WIGAN.—A mortuary constructed about the year 1878 in the grounds of the Infectious Hospital, and intended for the purposes of the general population. Much difficulty experienced in inducing poor people to make use of it.

C. ABROAD.

AMSTERDAM.—Infectious corpses are placed in two special chambers reserved in the mortuary.

BERLIN.—A mortuary with two common rooms and a dissecting-room. Mortuaries stated also to exist in the greater number of the cemeteries.

BREMEN.—A common room for the deposit of corpses, a dissecting-room, a laboratory, and an anatomical museum.

BRESLAU.—Mortuary chambers in certain cemeteries. An endeavour is being made to establish others.

BRUSSELS.—A mortuary will shortly be erected (if not already finished), specially with a view to the reception of corpses without proper accommodation at home. The mortuary, which will be a part of the Church of St. Katherine, consists of a large hall or room, in which will be built a number of compartments separated by half-partitions, cut at their lower part to allow the air to circulate top and bottom. Orifices for the entry of the exterior air will be made in the lower part of the walls, and the vitiated air will escape by a chimney placed in the middle of the vault of the room, and provided with a crown of gas jets.

CARLSRUHE.—A building in the new cemetery, which is both a mortuary and an anatomical institute. There is a common room, and separate cells for particular corpses.

COLOGNE.—A mortuary for the reception of bodies of persons dying in crowded homes. The superintendent is the keeper of the cemetery, who goes from time to time into the rooms to observe the changes in the bodies. At the end of seventy-two hours the coffins are closed and taken away.

DUSSELDORF.—A mortuary containing a vaulted room underground, in which are placed those corpses whose death is incontestable. It serves also especially in times of epidemic. On the ground floor there are a mortuary chamber and a post-mortem room.

FRANKFORT.—A mortuary consisting of ten cells, ranged round a room in which is a watchman.

GENEVA.—One room in the Morgue is reserved as a mortuary chamber. Those corpses which have not been interred in one of the parishes of the canton, within the time fixed by law, and the burial of which is delayed, must be taken to this mortuary. A tax of five francs a day, for the first ten days, is imposed for the deposit of the corpse. The corpses thus deposited must be placed in a lead coffin and a coffin of strong oak.

GRATZ.—Reception room at each cemetery.

HAMBURG.—Two mortuary chambers.

LEMBERG.—Mortuary chambers in each hospital and in each cemetery.

MILAN.—Mortuary chambers in the new cemetery.

MUNICH.—By the terms of a police ordinance dated July 1, 1862, corpses must be taken to the mortuary within twelve hours after death, or, when disease is epidemic, within six hours. The departures from this rule are stated to be quite exceptional. The transfer of the corpse to the mortuary is made in a special carriage. In each quarter, a woman appointed by the municipality is charged with the shrouding of the body.

NAPLES.—Two mortuary chambers, one a reception room, the other for post-mortem examinations.

NEW YORK.—Public Morgue at the Belle Vue Hospital.

PARIS.—Although there is here the well known Morgue (which is about to be replaced by a new one), there is no public mortuary in the ordinary sense of the word.

PRAGUE.—Mortuary chambers in nearly all the parish churches, and in all the hospitals.

ROME.—Mortuaries in each parish: used when circumstances compel a prompt removal of the body.

ST. PETERSBURG.—A mortuary is about to be erected in the old cemetery.

STUTTGART.—A mortuary in the central cemetery. Two large rooms on the ground floor, two on the first floor, a special room for particular corpses, and a dissecting room with its accessories.

ULM.—A mortuary containing (1) an underground common room in which are placed the corpses of those who have succumbed to infectious diseases; and (2) a common room on the ground floor for the deposit of corpses, a certain number of cells for the reception of a corpse by itself when the family desires, and a dissecting-room.

VENICE.—A mortuary in course of erection.

VIENNA.—At Vienna there is a mortuary, the 'Todten Kammern,' where the unknown dead are exposed for identification. It consists of a number of long bare rooms, with the windows placed high up in the walls. Arranged round each chamber are a number of sloping couches upon which a strong light is thrown from reflectors placed in the ceiling.

WEIMAR.—A mortuary situated to the north of the cemetery, arranged both for the deposit of corpses and as a post-mortem room.

Mr. Woodman had remarked, during the reading of the paper, the omission of Exeter from the list of places in which mortuaries were provided. Exeter had a mortuary at the Cemetery, open to use without charge, and he could speak most highly of the way in which it was conducted. The more they could induce people to bury early, or at least to remove the dead from the homes, the better. He instanced deaths which had resulted from people kissing the bodies of their deceased friends.

Mr. Chadwick said it was timely that this subject should be brought forward. It would require great delicacy and skill, speaking of the metropolis, in carrying out. His conclusion, after investigating the subject some time ago, was that doing the thing well and improperly depended upon the means, and that the subject should be left alone unless there were the means. In some Continental States a body must be interred within twenty-four hours, but no body could be interred unless a medical officer had testified to the death and the cause of death. The mode required great skill in its accomplishment, but as to the necessity there could be no question. The horrors and dangers of keeping the dead body among the living evidenced the barbarism in which we were still, and the low state of civilisation, which did not regard those conditions and did not go into them. The provision of the mortuary system would require a great deal of administrative skill in the officers and in the provision of the appliances.

Mr. Burdett requested that those who had information concerning mortuaries not mentioned in the paper should send it to him, addressed to Greenwich Hospital.

Dr. Carpenter said that Mr. Burdett had made no reference to cremation.

Mr. Woodman remarked that the great objection to cremation was the difficulty of preventing murder and the possible prevention of the detection of crime, such as that of Palmer, the Rugeley poisoner. Burial poisoned the ground, but cremation purified.

Mr. Chadwick said that the papers once, the *Spectator* in particular, accused him of having advocated cremation. The fact was that not only he, but the first General Board of Health, carefully examined the question, and it was his belief that interment with economy—that was, that the earth burials should be without placing large numbers of bodies in one grave—was better than cremation. The evidence had not been altered, and he adhered to his opinion.

Mr. Burdett explained that he had not referred to cremation because he had strong objections to it, added to which there were religious and other objections; moreover, Mr. Cross had said that in his opinion cremation was illegal, and if it were not he would very soon make it so.

Abattoirs.

In 1848 I published a treatise 'On Slaughterhouses considered in connection with the Sanitary Question.' It will be remembered that about that time a Committee was formed to assist the Government in introducing legislation for the establishment of a sanitary system for the management and control of all questions relating to the removal of refuse to a distance from the midst of populations, so that it should not be retained or allowed to increase proportionately with the population. The system was also intended to comprehend regulation of all necessary powers connected with sanitary matters.

The result of the investigation was that the Public Health Act (1848) was introduced into Parliament and passed. Being a member of the Committee above referred to, I took up the branch of the question relating to slaughterhouses, and was induced to publish my treatise.

I may repeat the quotation from Shakespere, which appears on the title-page—

> Away with me all you whose souls abhor
> The uncleanly savour of a slaughterhouse,
> For I am stifled with the smell.

In order to fully understand the subject I visited Paris, where, it may be recollected, five large abattoirs had been built about the year 1809, under decrees and by the authority of the first Napoleon. I procured the plans from which these buildings were erected at Paris, as well as those in other cities on the Continent, and of the very few that had been established by private individuals and corporations of towns in this country. None of the latter, however, were under municipal control, and consequently they only concentrated the evils of the system of slaughterhouses, and were for the most part undertaken and managed as a matter of private remuneration.

My attention was not merely directed to the structural arrangements and design of the buildings, but also to the laws, rules, and regulations for the conduct of the whole system. I may here state that, considering the period at which the buildings at Paris were erected, and at which the regulations for their management were drawn up, it shows a remarkable foresight and consideration for the necessities and health of Paris, and for the future increase of the population.

A detailed description of the five buildings, their situation with regard to localities, the system of taking the animals by certain routes from the markets to the abattoirs, and the distribution of meat to different parts of Paris, would probably be interesting, but would not very much assist or promote the questions which the Institute aims at.

I read a paper at the Institution of Civil Engineers in 1849 (vol. viii. p. 66 of its 'Transactions') which refers to the buildings, and not only gives a full description of all regulations of the manage-

ment of the abattoirs, but the statistics of the trade of the butchers and markets and the control exercised by the municipality of Paris over the trade.

The Paris abattoirs have of late years been removed from Paris in consequence of the crowded state of the city and the increasing value of property, and have been erected in the suburbs, but I have not seen them, nor do I know in what manner they are governed.

I should say that there was a large income derived from the original abattoirs.

I have had occasion to suggest modes of management of public slaughterhouses. It is obvious that they should be adjacent to cattle markets.

I should deprecate their being under the management of private persons, because I think they should always be under the control of the local authority both in constructing and laying out the buildings, and in the removal and disposal of the offal and filth.

There is no doubt but that if the offal and manure were dealt with by the authority and the most made of the products, a fair remuneration might be obtained, and that the butchers should have an equivalent for these products being taken.

The melting of tallow could be carried on within the precincts of the abattoir, also the preparing hides for tanning, manufacturing catgut and glue, and treating blood for some purposes, treating bones, making Prussian blue, and several other processes.

By such means and by letting portions of the buildings for slaughtering, as well as by storing meat in proper places, the Paris abattoirs made a good return, although their expenses for inspection and men were very considerable.

It need scarcely be said how many nuisances from unpleasant and injurious effluvia among populations would be removed not only out of sight but out of smell if abattoirs were established.

Other material benefits are obtained under the combined system which abattoirs afford in the killing and dressing meat, and in the inspection of unwholesome meat which can be at once detected and destroyed.

I know that abattoirs have been erected in several towns in England, and the Local Government Board have recently issued model bye-laws both for the control of markets and abattoirs, and have laid down stringent rules for the use of sanitary authorities. But from the first, when my attention was called to this branch of sanitary government, I felt that the slaughtering of animals should be compulsorily carried out in one or more spots according to the size or population of the town, and that the buildings should be erected and managed in very large populations under the superintendence of the local authorities. I am aware that should this be carried out it would interfere with the business of private persons, but in time that might be got over.

R. B. GRANTHAM.

Mr. CHADWICK said that the General Board of Health also examined this subject, but found that to give full effect to the utilisation there must be a centralisation of the abattoirs, so that while the prevention of disease was attained the products of the place were collected on the spot for utilisation. Scotland was sending meat to the Metropolitan market, and the manurial products, &c., were utilised at the place of production. Then there was also to be considered the importation of meat from abroad. The importation of disease in cattle had its origin in the same way as the importation of disease among human beings, by the massing of cattle unhealthily together. It was necessary to prohibit the slaughtering of cattle in small and improper places.

Mr. RAWLINSON said that in this country we were not sufficiently aware of the fearful results of private slaughtering. If all the cattle were slaughtered in properly-constituted slaughter-houses, there would be no chance of a great deal of the diseased meat being consumed. Not long ago he was sent over to Dublin at the head of a Royal Commission, and found that in Dublin there was not a single public slaughter-house. He and his colleague recommended that public slaughter-houses should be built, and the private slaughter-houses closed. But he deprecated the massing of slaughter-houses, and making huge show establishments of them. In Paris the abattoirs covered over 60 acres, and anything so dreadful to the non-professional visitor he could not have conceived. Men and women, engaged in the slaughtering of cattle, were covered with blood from the tips of their toes to the crowns of their heads. After a sight of the way in which calves were used he could not eat veal for a long time, and he promised himself that he would never go again into a large public slaughter-house.

Mr. WHITE asked if the use of the Exeter abattoir was compulsory?

Mr. RAWLINSON replied that if a Local Board provided an abattoir, and a private slaughter-house was shown to be a nuisance, the latter would be closed, and the butcher would be obliged to use the abattoir.

Mr. WOODMAN expressed a hope that the public would only deal with butchers who slaughtered at the abattoir, for he was convinced that dead animals were taken into the private slaughter-houses.

Mr. GRANTHAM, in his reply, said that it could not be expected that butchers should remove from their private slaughter-houses unless there were abattoirs provided. Now they had been provided in Exeter the town could close the private slaughter-houses by proceeding against them as nuisances.

It being now past 5 o'clock, an adjournment took place, the PRESIDENT remarking that they had had a very successful Section, and he trusted that it would be an earnest of the remainder of the business of the Congress.