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HELD AT PORTSMOUTH, 1892.

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ON

THE VICTORIAN ERA, THE AGE OF SANITATION.

By SIR CHARLES A. CAMERON, M.D.,

PRESIDENT OF THE CONGRESS.

My first duty, as President of this Congress, is to tender on behalf of the Sanitary Institute most cordial and hearty thanks to the Mayor, Municipality and people of this ancient town for the kind reception they have accorded to their visitors. This town has no reason to dread the scrutiny to which it will be subjected by the swarm of hygienic critics attracted by this Congress, for it would be indeed a happy day for these countries if all their towns were as healthy as Portsmouth, which in this respect is only exceeded amongst the great towns by three, namely, Norwich, Derby and Brighton. In the period 1881-90 the average death-rate in the 28 largest towns of England was 23; in Manchester it was 29.6; in Portsmouth it was 19.6; in Brighton 19.0; in Derby 19.3; in Norwich 19.1. These are the death-rates, corrected by age and sex distribution, and by the results of the census of 1891.

My next duty is to express my thanks to the Council of the Sanitary Institute for the honour which they have done me in selecting me to preside at this important Congress, in which are assembled so many of the most distinguished Sanitarians of these countries, and to whom I am sure my arguments will seem trite and my facts threadbare. I believe that I am the first Irishman who has been invited to preside at any of the great annual gatherings held under the auspices of the Sanitary Institute. Perhaps I may be permitted to accept the fact as a compliment paid, not so much to so humble an individual as myself, as to the country from which I come, and which, indeed, has of late years no reason to complain of being unnoticed by the people on this side of the Channel.

The reigns of many of the Sovereigns of these countries have

been rendered famous by successful wars, by great acquisition or loss of territory, by religious and political revolutions, by the works of intellectual giants, such as Shakespeare, Bacon, and Newton. The prosperous and prolonged reign of our beloved Queen has been as pregnant of great events as any of her royal predecessors, but the happiest and most characteristic feature of her glorious reign of five-and-fifty years is the remarkable improvement which, during that period, has taken place in the health and comfort of her people. The Victorian era is the age of sanitary and social reforms—of diminished sickness, of increased longevity. Never has the British people been so free, so happy, so rich, so powerful, so educated, so moral, so philanthropic, so healthy as during the Victorian era.

From the earliest ages, since the people of these Islands emerged from barbarism, some attention was given to the subject of public health, and a few enactments, more or less relating to the health of the people, may be found on the Parliamentary Statute Books and amongst the edicts of the Sovereigns previous to the nineteenth century. Their provisions were, however, rarely enforced, and if all the Sanitary Acts passed before Her Majesty's reign were collected, they would form a volume of no great size. Let us see what the Victorian age of Sanitary legislation and literature has produced.

The first important official report in reference to the health of the people was issued in 1842, under the title of "Report of the Sanitary Condition of the Labouring Population of Great Britain;" it was soon followed by legislative action. A Factory Act was passed in 1844, and this was the first of the many general statutes more or less relating to the public health enacted during Her Majesty's reign. In 1845 a Nuisances Removal Act was passed, and in 1848 the well-known Nuisances Removal and Diseases Prevention Act was put on the Statute Book. In 1866 a useful "Sanitary Act" came into operation, and in 1872 was followed by a Public Health Act. The Common Lodging Houses Act of 1851 was the first that dealt specifically with the dwellings of the poorer classes of the community. These six Acts of Parliament have all been amended and extended—some of them a great many times—and they and the amending Acts constitute perhaps the most comprehensive code of sanitary laws ever enacted in either ancient or modern times. In addition to those Sanitary Acts, other important ones have been passed in relation to burial grounds, mines, town parks and open spaces, the adulteration of food and drugs, the diseases of animals used as food, the sale of milk, margarine, and poisons, the pollution of water, trade nuisances, the construction and management of bake-houses, the storage of explosives and petroleum. Numerous private Acts of Parliament, obtained by

local authorities, are either altogether sanitary or contain clauses relating to sanitation.

Numerous as are the volumes of Sanitary Laws, they are exceeded by those containing the evidence in relation to sanitary matters given before Parliamentary Committees, Royal Commissions, and "Departmental" Committees, together with the reports thereon. These "Blue Books" constitute an immense library, in which voluminous details are given in relation to the dwellings, occupations, food, water supplies, diseases, and medical relief of man; and to the hygiene and municipal administration of towns. The Blue Books issued from the Medical Department of the Local Government Board and the Army and Navy Medical Departments are numerous and valuable.

A third department of sanitary literature consists of the annual and special reports of the Medical Officers of Health, which may be numbered by thousands. They are the annals of sanitary progress. Until very recently they dealt only with the health of towns; but in the future we may expect valuable reports on purely rural districts from the County Medical Officers of Health. Until now nothing worth boasting of has been done to improve the status of health in the open country; but the last Local Government Act has created for the rural districts Sanitary organizations similar to those which have long existed in towns. We might venture to hope that under the new regime of County Councils, the well-known rural death-rate of 17 per 1,000 may be reduced to 16 or less.

Not so numerous as the reports of Medical Officers of Health, but not less interesting, are the Transactions and Journals of The Sanitary Institute and similar organizations. The journal of the Statistical Society is rich in Sanitary literature. The Transactions and Journals of Medical Sanitary Societies and of the Public Health Sections of Medical Associations contain numerous contributions to hygienic literature.

Public health has its representatives amongst the periodicals of the day; for example, the "Sanitary Record," "Hygiene," the "Health Record," &c. It has also special departments assigned to it in most of the purely medical journals. In May of the present year a welcome addition to our periodical literature appeared in the shape of the "Journal of Pathology and Bacteriology," in which, judging by the names of intending contributors on its title-page, we may expect some brilliant writing on the causation and prophylaxis of microbial diseases.

Prior to the Victorian age there was only one really comprehensive and philosophical book on Hygiene published in Great Britain; this was the "Philosophy of Health," by Dr. Southwood Smith, which appeared in 1838, and which still may be read with advantage. For some years past dozens of books, more or

less relating to public or private hygiene, issue annually from the Press; many of them of large size, as for example, the ponderous book by Stevenson and Murphy, issued in the present year, and which, though only the first volume of a treatise, numbers 1018 large pages.

There is no more convincing evidence that this is the age of sanitation than the fact that the books on the subject published within the Victorian era would furnish a large library, whilst those of an older date would hardly garnish a single book-shelf.

The higher estimation of preventive medicine, which lately prevails amongst the professors of the healing art, is shown by the recent institution of degrees, diplomas and certificates in Public Health, State Medicine, and Sanitary Science by the universities and medical and surgical corporations. I am proud, as a citizen of Dublin, to be able to state that the university of that city was the first to create a diploma in state medicine. That was in the year 1865. Its example has been followed by all the other medical licensing bodies, and there are now some hundreds of holders of sanitary qualifications. I may also be permitted to say in this connection that the Professorship of Hygiene, which I hold in the Royal College of Surgeons, Ireland, was the first instituted in Europe, with, I believe, one exception, namely, that in the Medical School of Montpellier. The Chair of "Hygiene or Political Medicine" of the Irish College of Surgeons was established in 1844.

Quite recently some of the medical licensing bodies have decided to require of candidates for their ordinary diplomas, evidence of study in Sanitary Science: and for the Public Health Diplomas it must be shewn that the candidates have worked in a chemical sanitary laboratory, and have studied the duties of a health officer under a Medical Officer of Health. It is a good sign of the times to find that the Medical Act of 1887, made Public Health Diplomas registrable qualifications.

In the future no one will be eligible to act as Medical Officer of Health for a town of 50,000 inhabitants and upwards unless he holds a registrable qualification in public health.

Before the Victorian era there were few Sanitary laws worth administering, and consequently no *raison d'être* for local boards or officers of health. Some drainage works were carried out by the town and country authorities, and a few attempts were made to improve the water supplies of urban districts. The filth produced in towns had to be got rid of in some way; on the other hand people were taught to be too economical in the combustion of fuel by the imposition of a rate on hearths, and they were encouraged to exclude daylight by having to pay a window tax.

The insanitary state of British towns was made painfully

evident by the invasion of cholera in 1831. According to official statistics there died from cholera in 1831-2, 31,376 persons in England and Wales, and 21,171 in Ireland. In 1848 cholera re-appeared in England and Wales, and destroyed 53,273 lives. In 1853, 20,097 deaths were ascribed to cholera, of which about one-half occurred in London. In 1866 it re-appeared, but with less fatal results. The deaths in England attributed to it were 14,378, in Ireland 2,501, and in Scotland 1,470; total 18,349. This lessened mortality was not due to the milder character of the disease, but rather to the towns being less filthy than they were during previous visitations. On the Continent so virulent and widespread was cholera at this time that it is computed it caused more than one million of deaths. In Italy alone it carried off 120,000 victims; and in the small countries of Holland and Belgium it caused 50,000 deaths.

When cholera first appeared in Dublin in 1831, the sanitary state of the city was deplorable, and consequently 5,632 out of a population of a quarter of a million perished. When it came again to Dublin in 1849, the condition of the city was not so bad, and the victims to cholera were only 1,664. In 1866 Dublin was for the third time visited by cholera, and on this occasion 923 deaths were caused by it. Sanitary matters were in 1866 better than in 1849; and were the disease again to invade Dublin, I venture to hope that it would be much less fatal than in 1866. I think that in British towns generally Asiatic cholera will not again cause such ravages as it did in 1831, 1848, 1854, and 1866. I am not very apprehensive that the epidemic which now rages on the Continent of Europe—in which it has appeared seventeen times since 1829—will extend to our islands.

It was probably the ravages caused by cholera in 1831-2, and more especially in 1849, that first awakened the public to the necessity of improving the hygienic conditions of towns. A committee appointed to enquire into the sanitary condition of the Metropolis reported in 1848 that no substantial improvement had taken place in the state of the back streets, lanes, alleys, and courts since the cholera epidemic of 1831-2. The committee expressed an opinion that if the disease were again to visit London, it would spread as extensively and prove as fatal as it did in the former visitation. This prediction was unfortunately but too soon verified; but in the meantime the era of sanitary activity was initiated by the passing of the Public Health Act of 1848. This Act, though it permitted and did not compel sanitary reforms, was a useful one, and was availed of to some extent, as was also the case with the Local Government Act of 1858.

An important agency in promoting sanitary legislation were

the valuable reports—issued in 1842 and 1845—of the Commission on the Health of Towns.

The powers conferred upon health authorities, at first almost invariably permissive, gradually became more of a mandatory character. What a difference, is there not, in the significance of these two words “shall” or “may” in a sanitary statute! The exercise of the powers vested in local authorities has resulted in the expenditure of an enormous sum of money. It has mainly been employed to secure pure water supplies, to construct drains, to pave streets, to thin out densely-inhabited places, to clear unhealthy areas, to erect dwellings of a healthful kind for the working classes, to provide public abattoirs, baths and wash houses, town parks and open spaces, to build and maintain fever hospitals, to adopt improved methods of filth disposal. The maintenance of staffs of sanitary officers has caused a large addition to the taxation of towns. Formerly very few towns were provided with even a single Inspector of Nuisances. In 1864 Dublin had but one sanitary officer, now it has nearly fifty. It must be admitted that the administration of the sanitary laws involves a substantial outlay of money. It is, however, money well expended. It gives a good return in the form of a lessened sickness rate and reduced mortality. It diminishes pauperism, by preserving the health of the working man. The death of the labourer by a preventable disease may have the effect of sending his children into the workhouse. Sanitation has greatly reduced the mortality caused by preventable diseases. We pay enormous sums for an Army and Navy to preserve us from foreign foes, to protect our liberty, property and lives. But there are foes our brave sailors and soldiers cannot defend us from—enemies that kill annually far more than ever fell upon the battlefields during our greatest wars. These enemies are the infective diseases, which are not necessarily concomitants of human nature, and the attacks of which may be, and some day shall be, warded off. We require an army of sanitarians to guard us against those deadly foes. They who vanquish them achieve victories far more glorious than ever warrior won. They are triumphs which are not followed by the groans of the wounded, the wail of the widow, or the cry of the orphan. The trophies of the conquest are increased health, life, and wealth to man.

As the soldier to be effective must be skilfully trained to the use of arms, and grounded in the knowledge of tactics and strategy, so should the sanitarian be thoroughly instructed in the principles of hygienic science, and capable of using the necessary instruments of research. It is not long since every medical man was considered perfectly competent to act as an officer of health, but now the model medical officer of health is expected

to know more than the ordinary practitioner. He is required to be familiar with the use of meteorological instruments, to have some knowledge of geology, to understand sufficient engineering, to know how sewers and drains should be constructed, trapped and ventilated. He may be called upon to suggest how the noxious effluvia from certain factories may be rendered innocuous. He is often requested to pronounce as to the fitness or unfitness of the flesh of animals as food for man, and he cannot do that properly if unacquainted with the diseases of those animals. Not unfrequently he acts as an analyst and examines potable water, determines the amount of carbonic acid in the air of places suspected of being unhealthy, and does other sanitary-chemical work. As yet he has not been called upon to do much as a bacteriologist, but in the immediate future the candidate medical officer of health will be expected to have a thorough knowledge of the pathogenic microbes; to be able to determine the number of micro-organisms per cubic centimetre of water, and to be an adept in the “cultivation” of bacteria, bacilli, spirilla, *et hoc genus omne*.

The medical officer of health will be something more than a physician and surgeon—he will, in a sufficient degree, be a bacteriologist, chemist, a veterinarian, a geologist, an engineer, a statistician, and, so far as the Sanitary statutes are concerned, a lawyer. Already several medical officers of health have taken the Barrister's degree.

Until quite recently there were no special arrangements made in the medical schools for teaching Sanitary Science; but this defect is being remedied, especially as regards the sanitary analysis of air and water, and the chemical and microscopical examination of food and drugs. Courses of lectures on hygiene and State medicine are also delivered, but at present not in all the medical schools. On the Continent bacteriological laboratories have been established in nearly all the Universities and seats of medical education, and in the great Pasteur Institute at Paris the methods of identifying and “cultivating” microbes may be studied. In these countries there is no great institution altogether devoted to researches into the intimate nature of those organisms, invisible to the unassisted eye, apparently almost without structure, yet endowed with a virulent potentiality rivalling that of strychnine or prussic acid. How marvellous, is it not, that we discover upon the confines of the visible world the causes of some of the most fatal diseases of man and of his subjects in creation!

There are few natural phenomena more wonderful than the enormous dynamic effect produced upon organized matter by these microscopic objects. A few, perhaps even one, of them introduced into the body of the largest animal may quickly raise

its temperature and deprave its vital functions, disorganising the whole living mass, which exceeds in dimension its enemy by countless billions. Shakespeare, whose genius was prophetic as well as sublime, anticipated the modern description of infective matter when he spoke of it as that "whose effect holds such an enmity with blood of man that, swift as quicksilver, it courses through the natural gates and alleys of the body, and with a sudden vigour it doth posset and curd, like eager droppings into milk, the thin and wholesome blood."

Some provision for the study and teaching of bacteriology has been made by Cambridge University, the Colleges of Physicians and Surgeons, London and Edinburgh, the College of State Medicine, the Brown Institute, and, but to no great extent, in a few other places. We have no place which can be compared to the Pasteur Institute in Paris; it is the largest and best equipped bacteriological laboratory in the world. The British Institute of Preventive Medicine, established in 1890, proposes to found a bacteriological laboratory and accessories, on a scale equivalent to that of the Pasteur Institute. For this purpose it asks the rich and generous British public to subscribe £100,000. Some handsome donations, including one of £2,000 from Mr. Mond, have resulted from this appeal; and let us hope that British philanthropy, to which we are indebted for many noble gifts to the Nation, will endow an institution, the objects of which are eminently for the benefit of man.

Hardly less important than the Medical Officers of Health, and the Medical Inspectors of the Local Government Board, are the rank and file of our sanitary army—the Inspectors, or rather *discoverers*, of Nuisances. Formerly anyone was considered competent to do the work of the Sanitary Inspector, and persons who had been failures in other walks of life were often provided for by appointing them to be Nuisance Inspectors. This happily is now as a rule an exploded practice. It is realized that the person who has to discover sanitary defects in dwellings, public institutions, factories, schools, and other places, should have some acquaintance with the laws of health. The Sanitary Institute never did a better thing than the institution of their certificates for Inspectors of Nuisances, and also for Local Surveyors. Since 1877 no fewer than 1,312 candidates for the sanitary certificate have been examined, of whom 825, or 63 per cent., were successful. During the same period 78 local surveyors received certificates, and 113 were unsuccessful.

During the Victorian age many millions of money have been spent in the execution of sanitary works, and in the maintenance of a legion of sanitary officers. Have the results of this vast expenditure of money and human labour been such as to satisfy

us that it has not been a waste of our pecuniary resources and our time? Do they encourage us to further outlay and increased exertions? I think both queries may be answered affirmatively. That money spent to improve the sanitary condition of places has not always been judiciously laid out is quite true, but the same may be said of expenditure for most other public purposes. It must, moreover, be admitted that the provisions of many of the Acts relating to health have not been fully carried out, and that many local sanitary authorities, especially in rural districts, have lamentably failed to perform the duties, whether permissive or mandatory, entrusted to them by Parliament. It would not be difficult to discover places where the sanitary statutes are almost or wholly dead-letters. They would indeed be dead letters in more places than they are were it not for the powerful influence exercised upon public opinion and on the conduct of the authorities by the Medical Department of the Local Government Board by such organizations as the Sanitary Institute, and by the pen and voice of earnest sanitarians. There are hundreds of towns and villages in these islands which are still unprovided with proper arrangements for drainage and filth disposal, and which are dependant upon scanty supplies of water, often of bad or inferior quality. On the whole, however, it must be admitted that the sanitary powers confided to the local authorities have been largely put in force. Let us see what good has resulted therefrom.

I do not propose to institute, except in the briefest manner, comparisons between the England of to-day and the England of a century or two ago. From 1700 to 1750 the death-rate in London was so high that population stagnated. In the former year the inhabitants numbered 665,200, and in the latter year 653,900. During this period the deaths were in the ratio of about 1 per 30 persons living. By 1801, the population had crept up to 777,000 and the deaths had fallen to 1 in 41 persons living. This great improvement in the state of public health in London was not, except in a trifling extent, the result of Sanitary legislation. People were becoming more enlightened on many matters affecting their health, partly owing to a more general knowledge of chemistry, physiology, and other sciences relating to man and his surroundings. When those entrusted with the conduct of public affairs became aware how much the health of people was affected by bad water, by foul emanations from cesspools, and by too great a density of population, they began to secure supplies of pure water, to construct proper house drains and street sewers, to remove systematically filth from houses and roadways and to widen streets. The promulgation of the natural laws of health preceded the enactment of laws of health by the State. Jenner's discovery of

prophylaxis in small-pox had for its corollary the vaccination laws. The chemical analysis of water was the basis of Acts of Parliament relating to water and rivers.

Until about 40 years ago common-sense was the only motive power which impelled sanitary reforms in London and elsewhere. It was not inoperative, for early in this century the grosser defects in public and private hygiene had been recognised, and, to a great extent, remedied.

In Rickman's Report to Parliament on the Census of 1811, he gives the following estimates of the death-rates in England:—

In 1780	...	...	1	death	per	40	persons	living.
„ 1790	...	...	1	„	„	45	„	„
„ 1800	...	...	1	„	„	47	„	„
„ 1810	...	...	1	„	„	49 or 50	„	„

If these estimates are reliable, it would seem that after the great improvement in the public health in the latter part of the eighteenth and early portion of the nineteenth century no sensible change for better or worse took place for about half-a-century. According to Rickman, the death-rate in 1810 would be about 20 or 21 per 1,000 persons living.

In Dr. Newsholme's excellent work on "Vital Statistics" he gives the death-rate for males in the period 1838-1854 as 23·28 per 1,000 males living, and the rate for females at 21·65. It would therefore appear that the mortality of the population had increased as the century grew older. Probably the earlier statistics, collected before the Act for the registration of births, deaths and marriages, were not quite accurate; no doubt some deaths escaped record. It would, however, seem that from 1810 to 1854—making some allowance for defective registration—there was no reduction in the death-rate. Even if we take the period 1851-60 we find no improvement: the deaths were in the ratio of 22·25. In 1861-70 the rate was 22·5, or 0·25 more than in the previous decade. It must, however, be borne in mind that from the beginning of the century population was increasing rapidly in the towns—which must always, at their best, be less healthy than the country—whilst in the rural districts population remained stationary or declined. It was therefore something to boast of, that although the towns of England were increasing in population at the rate of from 200,000 to 300,000 annually, the death-rate of the whole country had not sensibly increased.

In 1872 a Public Health Act was passed, which was amended and improved in 1875. This Act has been one of the most valuable ever passed, and to its operation must be reasonably attributed the improvement of the public health during the last two decades.

During the ten years ended in 1850 the mean annual death-rate in the metropolis was 24·8 per 1,000 persons living; in 1851-60 the rate was 23·4, and in 1861-70 it was 24·1. During these thirty years there was no marked improvement in the sanitary state of London. Now comes the epoch of sanitary activity: in the period of 1871-80 the death-rate fell to 22·5, and in the decade ended in 1890 it further declined to 20·5, or 4·3 below the rate for the period 1841-50. If the death-rate in Greater London was as high during the years 1881-90 as in the period 1841-50 nearly 50,000 more deaths would have taken place.

Early in the century the provincial towns were with few exceptions more insanitary than London. In reading the local literature of these places one often comes across descriptions of the abodes of human beings which are almost incredible, and which happily would now apply to very few English towns. In a pamphlet, entitled "Religion and Crime," by Mr. John M. Morgan, and published by Longmans, London, in 1832, a dreadful description of Bristol is given. The author states that 566 families occupied each only *part of a room*, and that 2,224 families lived each in a single apartment. In a report upon the sanitary state of Nottingham, in 1839, by Mr. Falkiner, it is stated that there were between seven and eight thousand houses in that town placed back to back, without any through ventilation and unprovided with the proper appliances of civilized life. It is not surprising that in Nottingham 99,017 cases of fever occurred in the years 1835-6 and 7; but it is surprising to find that notwithstanding the acknowledged unhealthiness of back-to-back houses nearly 10,000 of them still exist in Manchester; need we then wonder that the mortality of the inhabitants of that great city exceeds that of every other of the great towns of England!

Mean annual death-rate in England and Wales:—

Period.	Males.	Females.	Total.
1841-70	23·3	21·5	22·4
1871-75	23·3	20·7	22·0
1876-80	22·1	19·5	20·8
1881-85	20·5	18·3	19·4
1886-90	20·0	17·8	18·9
1891	21·5	19·0	20·2

In 1851-60 the death-rate in large towns was 24·7, and in the country 19·9. In 1888-91 the rate in the towns was 20·4, and in the country 17·5.

The year 1891 was an unhealthy year, as will now and then be the case; but even in that year the mortality was much below that of the period 1841-70. If it were equal to the mean rate for that period there would have been 63,749 more deaths during the year.

The low death-rate in England is all the more remarkable

when we consider the very large proportion of the population located in towns. In 1892, 18,931,070 persons lived in towns and 10,472,276 in the country; total, 29,403,346.

Whilst the death-rate of London has been declining the population of the great city has been increasing and concentrating. In 1841 the density of its population was moderate, *i.e.*, 25 persons per acre; but in 1891 there were 56.5 persons per acre. Large and dense populations are as a rule more unhealthy than small and widely scattered ones. In London the unfavourable influence of the closer approximation of its inhabitants, is much more than compensated for by the great improvements effected in the general hygienic conditions of the City.

In every other large country in the world the rural population greatly exceed the urban; in England it is the reverse, 19 out of its 29 millions live in the big towns. It is surprising that under such conditions, the whole population of England have a greater longevity than the French, Germans, Russians, Italians, and Spaniards. It is observed that whilst the mortality of males under 35 years of age, and females under 45 years has been largely reduced, the mortality of males over 35 years, and of females over 45 years has increased. I can hardly believe that this is due to the elder persons being now more than formerly injuriously affected by insanitary conditions. Much more likely is it the result of the preservation of the lives of delicate or weakly children, who developing into adults of poor physique, and low longevity, lower the average death-rate of the adult classes; for as Dr. Newsholme has truly said, the same causes which have lowered the mortality of children and young people, have also improved the average health of those who survive. It is at least certain that the mere expectation of life as it is termed—that is the probable duration of a life, at birth—has been largely increased within the last 25 years. As women and children are most exposed to the bad effects of insanitary dwellings, it seems probable that their improved health is due to improved domestic hygiene. Men are exposed to greater risks of loss of health and life than women or children. Accidental deaths are more frequent with them; and their occupations are often of an unhealthy kind. For one woman in the accident ward of a hospital there are half a score of men.

With respect to Scotland, we gather from the Annual Reports of the Registrar-General of that country, the latest of which refers to 1889, the following facts:—

The mean death-rate in Scotland during the period 1855-64 was 21.3 per 1,000. The rate remained much the same until the period 1880-89, when it fell to 19.3. In 1855-64 the rate

in the large towns was 27.74; in the ten years ended 1889 the rate was only 22.78.

With respect to Ireland the great Public Health Act, under which the Sanitary authorities now work, came into force in 1878. In the years 1871-80, the average annual death-rate per 1000 of mean population was 18.3, and in the ten years ended in 1890, 17.9. During these periods the rates in the Poor Law Unions, or Superintendent Registrars' Districts, containing towns which had in 1871 or 1881, a population of 10,000 or upwards, were 22.5 and 22.6 respectively. These figures would seem to indicate some progress in the rural districts, and a slight retrogression in the urban districts. There are, however, strong reasons to believe that until 1879 registration of deaths was very defective in Ireland. The 191st Section of the Public Health (Ireland) Act, 1878, "provided that the clerk, or secretary or registrar of every burial board and cemetery company or authority, having charge of any burial ground, shall make, or cause to be made, at such times and in such manner as the Local Government Board may direct, a return of the names, addresses, dates of death, and causes of death, so far as ascertained by him, of the persons whose bodies have been interred in such burial ground, to the registrar of the district in which such persons resided at the dates of their deaths respectively." As the clerks to the burial boards are paid for these reports, it is highly probable that they never fail to make them. It was found in Dublin that the returns of burials exceeded by 10 per cent. the registered deaths, from which it follows that previous to 1879 a large number of deaths was not registered, and the published death-rate was 10 per cent. or so below the true rate. It is probable that in many foreign and British Colonial cities, the published death-rates are not the true rates—some of them are suspiciously low.

In the case of the Irish urban districts it is highly probable that the registration of deaths was much more accurate in 1881-90 than previously; hence it follows from the figures which I have given that the true death-rate was less in 1881-90 than in 1871-80.

The general death-rate in Dublin declined in the period 1881-90, 15.59 per cent. as compared with the previous ten years, and the decline in the zymotic death-rate was 44.05 per cent.

There is no department of State medicine of greater utility than vital and mortal statistics. But for their use public attention could not be directed to abnormal mortalities, with the view of reducing them to reasonable proportions. What an important lesson, is it not, to us to know that in the country only 17 persons die yearly out of every 1,000 persons living,

whilst in towns from 19 to more than 30 perish annually! A knowledge of such facts as these—which we learn from the statistician—has been the principal and most successful argument used in pleading the cause of sanitary reform. We shall not be satisfied, says the sanitary enthusiast, until there shall be a uniform death-rate in town and country. Much has been done in rendering the conditions of town life more healthy than they were, but vast is the task still to be accomplished. We see that four more persons per 1,000 die in the town than in the country; but the difference between urban and rural mortality is even greater than this. The population of the whole country is distributed into groups according to age. The death-rate in the different groups is ascertained; in some it is very high, in others very low. For example, from 10 to 15 years the mortality per 1,000 is less than one-half as compared with the ages 25 to 35. In the towns the population have a larger proportion of persons whose expectation of life is longest. Brighton and Plymouth are the only exceptions to this rule. Females live longer than males, therefore a larger preponderance of females in a town than in the country at large lowers the apparent death-rate of the former. The "recorded" or crude death-rate in towns is corrected for what in statistical terminology is termed "age and sex distribution." In 1890 the recorded death-rate of Portsmouth was 19·59, and its corrected death-rate 20·18. In Manchester the crude rate was 30·57, and the corrected one 34·06.

The vital and mortal statistics of towns being the principal means by which their actual and relative sanitary states can be ascertained and compared, it is desirable to collect them accurately. Mortal statistics are useless unless we know the number, ages, and relative proportion of males and females of the population to which they refer. This information is obtained only once in ten years. The increase of population (if any) between the year in which a census had been taken and that which next followed having been ascertained, it is assumed that a similar increase goes on subsequently to the second census. The census of 1891 proved that the estimates of population for the previous ten years were very inaccurate in the case of several towns. For example, the annual increase of population in Belfast was estimated to be 1·3 per cent. per annum, but it proved by the census of 1891 to be 2·5 per cent. On the other hand, Liverpool was found to have had its population in 1891 over-estimated by nearly 100,000. A comparison in 1890 of the death-rates of Belfast and Liverpool would have been unjustly to the disadvantage of the former. In the last Annual Summary of the Registrar-General of England of births and deaths in towns, the usual

correction for the death-rates is not given, owing to the numbers of the population according to the census of 1891 not having been revised. I have, using the census returns of 1891, recalculated and corrected for age and sex the death-rates in the English (28) towns for the period 1881-90, and find it to be as follows:—From all causes, 23; from the principal zymotic diseases, 3·1. These rates are higher than the corrected rates published during the decade. I give a table shewing the correct death-rates in English and Irish towns for this period, and some previous ones.

	England & Wales.	Dublin.	Belfast.
All ages ... ..	1,000·00	1,000·00	1,000·00
Under 5 ... ..	135·55	108·61	123·05
5 to 20 ... ..	327·05	289·43	326·03
20 to 40 ... ..	295·02	345·78	332·28
40 to 60 ... ..	158·60	183·63	156·43
60 and upwards ... ..	73·78	72·55	52·21

*Recorded and Corrected Death-rates per 1,000 in Twenty-eight Great Towns in 1890.*

TOWNS In the order of their Corrected Death-rates.	Recorded Death-rate.	Corrected Death-rate.	Comparative Mortality Figure.
England and Wales ... ..	19·19	19·19	1000
England and Wales less the twenty-eight Towns ... ..	18·19	17·79	927
Twenty-eight Towns ... ..	21·35	22·75	1186
Nottingham ... ..	16·47	17·46	910
Brighton ... ..	17·76	18·29	953
Leicester ... ..	17·92	18·77	978
Derby ... ..	18·51	19·25	1003
Hull ... ..	19·25	19·86	1035
Bristol ... ..	19·21	19·88	1036
Norwich ... ..	21·06	20·14	1050
Portsmouth ... ..	19·59	20·18	1052
Huddersfield ... ..	18·98	20·84	1086
Birkenhead ... ..	19·69	21·06	1097
London ... ..	20·30	21·55	1123
Birmingham ... ..	20·74	22·12	1153
Plymouth ... ..	22·42	22·20	1157
Wolverhampton ... ..	21·82	22·50	1172
Bradford ... ..	20·39	22·52	1174
Cardiff ... ..	20·76	22·53	1174
Oldham ... ..	21·23	23·56	1228
Sunderland ... ..	22·72	23·66	1233
Leeds ... ..	22·63	24·19	1261
Salford ... ..	22·36	24·34	1268
Halifax ... ..	22·46	24·40	1271
Blackburn ... ..	23·47	25·58	1333
Liverpool ... ..	23·55	25·84	1347
Sheffield ... ..	24·93	26·81	1397
Newcastle-upon-Tyne ... ..	25·87	27·38	1427
Bolton ... ..	25·78	28·25	1472
Preston ... ..	27·43	29·79	1552
Manchester ... ..	30·57	34·06	1775



*Twenty-eight Large English Towns, 1881-1890.*

TOWNS.	Recorded Death-rate.	Corrected Death-rate.	Zymotic Death-rate.
28 Towns	21.6	23.0	3.1
London ...	20.5	21.8	3.0
Brighton ...	18.5	19.0	2.2
Portsmouth ...	19.0	19.6	2.7
Norwich ...	20.0	19.1	2.4
Plymouth ...	21.4	21.2	2.5
Bristol ...	19.3	20.0	2.1
Wolverhampton ...	21.7	22.4	2.6
Birmingham ...	20.8	22.2	3.0
Leicester ...	20.6	21.6	3.1
Nottingham ...	21.5	22.8	3.0
Derby ...	18.6	19.3	2.1
Birkenhead ...	19.9	21.3	2.5
Liverpool ...	26.3	28.9	4.1
Bolton ...	22.4	21.5	3.4
Manchester ...	23.6	20.6	3.5
Salford ...	24.5	26.7	4.3
Oldham ...	23.9	26.5	2.7
Blackburn ...	24.8	27.0	3.8
Preston ...	26.5	28.8	4.0
Huddersfield ...	20.8	22.8	2.0
Halifax ...	21.2	23.0	1.6
Bradford ...	20.4	22.6	2.4
Leeds ...	22.1	23.6	3.2
Sheffield ...	22.0	23.7	3.5
Hull ...	21.0	21.7	3.1
Sunderland ...	22.7	23.6	3.4
Newcastle-upon-Tyne...	22.5	23.8	2.9
Cardiff ...	20.7	22.5	3.1

*Re-calculation of Death-rates in English Towns.*

YEARS.	LARGE ENGLISH TOWNS.		
	Recorded Death-rate.	Corrected Death-rate.	Zymotic Death-rate.
1876-1880 ...	23.3	24.8	3.8
1881-1885 ...	21.9	23.3	3.3
1886-1890 ...	21.2	22.6	2.9
1881-1890 ...	21.6	23.0	3.1
1881 ...	21.8	23.2	3.4
1882 ...	22.4	23.9	3.6
1883 ...	21.9	23.3	2.9
1884 ...	22.1	23.6	3.6
1885 ...	21.1	22.5	2.8
1886 ...	21.6	23.0	3.0
1887 ...	21.6	23.0	3.3
1888 ...	20.1	21.4	2.5
1889 ...	20.3	21.6	2.9
1890 ...	22.6	24.1	2.9

*Re-calculation of Death-rates in Dublin, Belfast, and Cork.*

YEARS	DUBLIN.			BELFAST.			CORK.		
	Recorded Death-rate.	Corrected Death-rate.	Zymotic Death-rate.	Recorded Death-rate.	Corrected Death-rate.	Zymotic Death-rate.	Recorded Death-rate.	Corrected Death-rate.	Zymotic Death-rate.
1876-1880 ...	29.5	32.6	5.1	26.0	29.8	?	30.8	33.7	?
1881-1885 ...	27.4	30.3	3.1	24.7	28.4	3.5	26.0	28.4	2.9
1886-1890 ...	26.2	29.0	2.9	24.4	28.0	3.0	24.3	26.6	1.8
1881-1890 ...	26.8	29.6	3.0	24.5	28.1	3.2	25.1	27.4	2.4
1891 ...	25.5	28.2	1.7	25.5	29.3	2.6	26.9	29.4	1.4

It would be desirable to have a census taken every five years; but the great expense this would entail is a barrier difficult to get over. The greater number of the social facts collected for census purposes are not of great value as factors for determining sanitary progression or retrogression. It might be sufficient to have a mere count of the people every third year. There would be little clerical labour in connection with such a census, but the information gained would be of great use to the Public Health Authorities. A triennial enumeration of the population of Liverpool and Belfast would have prevented the extremely incorrect estimates made for so many years in reference to the birth and death-rates in those cities.

I have already stated that the results of past sanitary work encourages us to redouble our exertions to reduce the urban death-rate to at least that of the most healthy of our towns. If the 23 per 1,000 rate of the 28 great towns were reduced to 19, it would mean a saving of 380,000 lives in a single decade.

The recent reduction of the death-rate is most marked in the case of the infective diseases. Of these phthisis, or pulmonary consumption, is the most fatal. It kills about 50,000 people every year in England, and in Dublin it produces a death-rate of nearly 4 per 1,000 of the population, or nearly double the mortality caused by what are termed the principal zymotic diseases. Hitherto very little has been done to prevent this disease from being propagated from the infected to the sound. It is, however, a great advance towards the proper prophylaxis of the malady to know that its immediate exciting cause is a micro-organism. We must not be discouraged because of Koch's failure to kill the bacillus of tuberculosis; in time we shall be able to control its ravages, and perhaps to extirpate it altogether.

At the International Congress of Hygiene, 1891, Dr. Burdon Sanderson expresses his belief in the identity of bovine with human tuberculosis, and his conviction that it was sometimes transmitted to man by infected flesh and milk. Professor

Macfayden said that the milk of tubercular cows was a vehicle of the disease of no uncommon occurrence, and he mentioned that he found the microbe of tubercle in the muscles of the ox. By guarding against the use of infected meat and milk, by the constant destruction of the sputa of phthisical patients, and by the adoption of other measures preventive and remedial, it is to be hoped that the ravages of the disease may in time be largely decreased.

A valuable and suggestive memorandum as to the prevention of phthisis has recently been issued by the North Western Branch of the Society of Medical Officers of Health; it deserves a wide circulation.

Whilst phthisis shows a tendency to decline, typhoid fever holds its own and even increases in many towns, and indeed in the rural districts. I have ascertained that in 50 large towns in the United Kingdom typhoid fever caused 2·3 deaths per 1,000 persons during the years 1886-91. In Dublin the rate was 5, in Belfast 5·1, and in St. Helens 5·2; this last was the highest rate.

Whilst typhus fever, once so prevalent, has now almost ceased to exist, it is evident that the hygienic measures which have eliminated it and small-pox from so many towns—notably Dublin—have had little or no effect upon typhoid fever. It attacks rich and poor alike, and prevails equally in town and country. I have made especial study of the disease as it appears in Dublin, and have come to the conclusion, that there, and perhaps elsewhere, it is miasmatic, or earth born. In Dublin during the last 10 years, one person in every 144 persons living on clay soils has had typhoid fever, whilst one in every 92 persons located on gravels have contracted the disease. The disengagement of the micro-organisms of this disease takes place when the soils become dry, and this occurs more frequently in the case of loose gravels than of stiff impenetrable clays. To soil pollution I attribute the prevalence of typhoid fever in these countries, and as a preventive against the disease, we must keep the underground air from entering our dwellings. We should be as particular with respect to the purity of the soils under and close to our dwellings, as we are with regard to the purity of the air which surrounds us. When all the organic *débris* produced in towns is quickly removed from them to a safe distance, when the dangerous subterranean atmosphere is prevented from entering our dwellings or even our streets, when sewage flows steadily day and night through well-constructed main sewers, and when our soils are thoroughly drained, and kept free from filth, then we may expect to see a substantial reduction in the mortality caused by typhoid fever and indeed by other diseases.

The high mortality of the working classes is in no inconsiderable degree due to the insanitary dwellings in which a large proportion of them reside. It is to the improvement of the homes of the artisans and labourers that we must chiefly look for a further reduction in the death-rate of towns. Two classes of houses are occupied by workmen and their families—one built specially for them, the other originally intended each for one family of the upper or middle class, but now converted into tenements, having from two to a dozen families each. The latter class of dwellings are often very old and dilapidated, and their woodwork honeycombed, their floors are sunken and patched, their walls damp owing to defective roofs, their stair-cases creaking and broken, their basement stories—formerly clean and well-kept kitchens—now noisome dark spaces, sometimes shut up to prevent them from becoming the asylums of homeless wanderers.

The houses built for artisans and labourers, by persons who only desire to make a profit out of them, are often very defective in construction and in the essentials of a healthy dwelling; their rents are generally too high for other than well-paid artisans. The benevolence of such men as Lord Iveagh and the late Mr. Peabody has provided dwellings of moderate rent, but unfortunately only a small fraction of the population can benefit by the generosity of these philanthropists. Many thousands of nice buildings for workpeople have been built by companies founded upon semi-philanthropic, semi-economic lines; but they, too, are generally let at rents exceeding 2s. per week. The houses which are the most insanitary, and in which the seeds of the fevers are nursed as in a hot-bed, are those occupied by the poorest classes—hawkers, the inferior kinds of labourers and porters, itinerant musicians, hangers-on about the markets, persons with no fixed occupation, poor widows, mendicants, the people who loaf about the streets (particularly in the neighbourhood of public-houses), the seedy persons "who have seen better days," &c. The rents paid, or promised to be paid, by these decayed, always miserably poor, people, are very small; and ordinary landlords could not afford to keep their dwellings in the state of repair, cleanliness and convenience which health requires, and indeed public safety demands. It is from these wretched abodes of the semi-pauper classes that the contagia of the infective diseases sally forth, to deal out disease and death amongst the people whose houses are in a fairly good sanitary state. It is not sufficient, therefore, to have our own houses in good order, we are interested, though of course not to the same extent, in having all the houses in our neighbourhood placed under healthful conditions.

For several years past Parliament has been enacting statute

after statute in reference to the improvement of the homes of the working classes; and the local authorities have now very large powers entrusted to them for the purpose of building dwellings for artisans and labourers. With respect to towns it seems to me that more has been done for the artisans than for the labourers. I think we should leave chiefly to the operations of the building societies and to private enterprise the providing of dwellings for artisans as they are fairly well able to take care of themselves; but if the money of the ratepayers is expended in constructing dwellings for the people who can only pay from 1s. to 2s. per week rent, then I say it is well laid out, because it tends to diminish sickness, death and pauperism. I know there are great difficulties, financial and other, in the way of substituting clean and moderately comfortable dwellings for the filthy dens in which dwell at least five per cent. of the urban populations. It is chiefly in such places that the criminal classes reside, and *they* would rather not be supervised by municipal officers. It is probable that a loss would be sustained by letting fairly comfortable and well-kept tenements at rents of from 1s. to 2s. weekly. Corporations can, however, borrow money at so low a rate of interest from the Government for the erection of labourers' dwellings, that if they adopt good schemes, they might provide very low-rent dwellings, without incurring much loss. In 1890 the Corporation of Dublin erected eighty-six dwellings for labourers. They consist of two-storied houses, each containing four tenements. There are nineteen of these let at 2s. per week. Each consists of a living room, 12 $\frac{2}{3}$  feet by 12 feet; a bedroom, 10 $\frac{1}{2}$  feet by 7 $\frac{1}{2}$  feet; and a scullery and other accommodation exclusively belonging to the tenement. The rent derived by the Corporation from these eighty-six dwellings pays the annual instalment of the loan of money by which they were built, the interest on the loan, and a surplus of nearly £100 a year. The Corporation, who have not spent a penny of their own money on these dwellings, will in thirty-eight years become their owners, as the loan by that time will be repaid.

In contrast to the good value which these Corporation tenants receive for the small rent which they pay, I show in the following statement the poor accommodation afforded to room-keepers in tenements let by house jobbers. In four streets (Church Street, Upper Mercer Street, North Cumberland Street, and Jervis Street, Dublin) I ascertained that 1,074 families resided in 170 houses. They occupied 1,482 rooms, less than one and a half rooms per family. The annual rent paid by the tenants was £8,311 13s., though the valuation of the 174 houses for rateable purposes was only £2,677 10s. The average weekly rent per family was 2s. 6 $\frac{2}{3}$ d. in Church Street; 2s. 8d.

in Mercer Street; 3s. 4 $\frac{1}{2}$ d. in Cumberland Street, and 3s. 8 $\frac{1}{2}$ d. in Jervis Street. These figures show that in Dublin at least the rents of the dwellings of the working classes are far in excess of their real value.

The education of the people in sanitation ought not to be confined to limited sections of society, but should be carried out as one complete and well graduated system for the instruction of the whole Nation. A study of the laws of health should form part of the system of primary education, and would be at least as interesting to the youthful mind as a study of the "three R's." The character and conduct of the man are mainly dependent upon the education and training of the child; so also in the future nation its action and progress will be the product of the education given to the actual nation in its infancy and youth. The sanitary lessons which are now being taught to the British people will bear good fruit in the century which is close at hand—the century, let us hope, of low and uniform death-rates.

We are living in an epoch when man is earnestly striving for a higher and better life—when, perhaps, more than at any previous phase of his history, he subordinates the baser instincts of his nature to its higher and nobler attributes. Yet there are not wanting those who view with indifference or scepticism the efforts which man makes to purify himself, morally and physically. These pessimists, or realists, as they love to call themselves, can see nature only in its darker side. They paint the horrors of the plagues, the carnage of the battle-field, the devastation of the earthquake and volcano, the destructive action of the tempest, the sufferings of the sick and dying, the long hours of toil, the intolerable evils of poverty, the miserable struggle for existence. They parade all the evils which afflict man—they review all his inherent failings, defects and vices. They grimly and passively await the moment when they must shuffle off their mortal coil, and like their meaner fellows in creation, commingle in the inevitable dissolution.

Fortunately for human progress these realists exercise but scant influence on the destiny of man. They seem to forget that the days of health out-number the hours of sickness; that we rejoice infinitely more than we mourn; that love preponderates over hate; that there is more happiness than misery; that even pain has its uses, as a preserver of life, as an incentive to pity.

Better far is it to look upon the bright side of nature and to appreciate the beauties of this glorious world of ours, with its towering mountains; its billowy seas; its magnificent forests; its vast expanses of emerald green; its innumerable forms of animal and vegetable life; its harmony of colours; its vast dome of sky, with glittering stars and golden orbs of light.

Surely ours is a world well worth living in,—a world of joy and beauty, which well may inspire us to look from nature up to nature's God; a world of which the poet says:—

“The poetry of earth is never dead  
When all the birds are faint with the hot sun,  
And hide in cooling trees—a voice will run  
From hedge to hedge about the new-mown mead.”

Many of the evils which the pessimists believe to be irremediable are in reality within man's power to lessen or destroy. Not a few of them arise from systematic violations of the laws of life and health. We can hardly be clean in our minds if we are foul in our bodies. We should keep corruption as far from us as possible. Let us dwell in the freshness of things, remembering always that filth is synonymous with disease and death. Let us worship at the shrine of that goddess who has given a name to the noblest of the sciences—that which relates to the preservation and improvement of that precious porcelain of man's body. Hygeia is depicted as not only beautiful but strong and vigorous, typical of what the human form ought to be. A great American poet says of her:—

“The leaden footsteps of care  
Leap to the tune of her pace,  
Fairest of all that is fair;  
Grace at the heart of all grace!  
Sweet'ner of hut and of hall,  
Bringer of life out of naught—  
Hygeia, oh fairest of all  
The daughters of time and thought!”

## SECTION I. SANITARY SCIENCE & PREVENTIVE MEDICINE.

### ADDRESS,

By PROF. J. LANE NOTTER, M.A., M.D., D.P.H.

PRESIDENT OF THE SECTION.

My first duty to-day is to thank the Council of The Sanitary Institute for the honour they have conferred on me in inviting me to preside over this section of the Congress.

It is an honour which I wish had been placed in abler hands than mine, and I must crave your indulgence for a short time while I offer a few observations on the causes and prevention of cholera, a disease which threatens in its onward march to visit our shores, and that at no distant date.

There is a certain area, bounded by more or less definite limits, wherein cholera is always endemic in India. This is comprised between the base of the Himalayas on the north, and the Bay of Bengal on the south; the north-west and central provinces on the west, China and northern Burmah on the east. Within this area is located the delta of the united waters of the Ganges and Brahmaputra. Whether this is the only endemic area is a question which I shall have to refer to again. And here let me briefly review the climatic state of this region. Traversed from north to south by the most uncertain and most impetuous river in the world, Bengal proper, or the true delta of the Ganges, is a mere alluvium, deposited, as it would appear, in a vast estuary, into which this great river poured forth his earth-laden water.

History tells us that within a comparatively short period this river has wandered out of one course into another, throughout an extensive tract of country, nearly every part of which has in consequence been left, virtually, in a condition of newly deposited land. Floods and heavy rains leave this flat and