LECTURE TO THE CONGRESS

BY

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THE object of the Sanitary Institute is to promote Sanitary knowledge in the community; and one of the methods by which it endeavours to effect this is by holding, from time to time, an Annual Congress in some important centre.

It thus affords a focus where those persons, interested in Sanitation in adjacent parts of the country, can assemble and discuss the numerous and important questions which surround the subject in what may be termed its present transition state.

The difficulty in an Address like this is to say anything which is new.

If you read Sir Edwin Chadwick's Report upon the Condition of the Labouring Classes, published in 1842, you will find nearly the same suggestions and proposals which we make now.

You will find, in that report, extracts from previous reports of Sanitarians, dating from the year 1800, inculcating the same doctrines.

The only change that we can now put our hands on is in the fact that the words of the earlier sanitarians fell on more sterile soil, and that the education of all classes is now by degrees fitting the people to take advantage of the advice.

There are so many conditions which bear upon our health; and in discussing the subject there are so many aspects in which it must be considered, that repetition on some points becomes a necessity.

Just consider for one moment how the subject meets us at every turn. It concerns our manner of living, our clothing, our food, our dwellings, our exercise, our work, our pleasures.

It concerns not ourselves only; our proceedings affect more or less seriously our friends and our neighbours.

The registration of the causes of death did not come into operation until 1837, when Dr. Farr entered the office of the Registrar-General of England, then presided over by Mr. Lister.

It is only since that period that data have been collected which have brought sanitation into the range of an exact science, by providing us with facts upon which to base our conclusions.

Leading sanitarians had long pointed out that a certain group of diseases was amenable to the control of preventive measures.

These diseases were small-pox, typhus, enteric fever, scarlatina, measles, whooping cough, diphtheria, cholera, and phthisis; but until accurate data as to the causes of death had been collected, their opinions could not be brought to the test of scientific enquiry.

We are now able to point, with unerring certainty, to the fact that given certain conditions of impure air, impure water, and a soil saturated with filth; sickness and death, from one or other of these preventable diseases, will ensue.

We are, however, even yet far from possessing a satisfactory system of registration.

Our published registration returns tell us that so many deaths occurred in a certain district, but the district almost invariably includes portions which are in a good sanitary condition where the health is comparatively good; whilst in other parts of the same district, where insanitary conditions prevail, the sickness and death-rate may be considerable.

The published average tends to conceal these differences of circumstances.

In order to be in possession of more complete data, we require registration districts more carefully divided according to their several circumstances. It is desirable to show the mortality in urban sanitary districts; it is desirable to trace out more fully the sanitary condition in which sufferers from preventable diseases have been living. We require a registration of disease, and it is hoped that the new Act, under which the local authorities are empowered to enforce compulsory notification of infectious disease in their respective districts will be generally adopted over the whole country.

The sanitarian has long associated dirt with disease; and the diseases above mentioned are all more or less affected by the retention, in near proximity, of emanations resulting from the processes of life in human beings and animals.

Small-pox is one of the most dreadful scourges which can afflict mankind. It spreads with fearful rapidity.

Recent investigations by Medical Officers of the Local Government Board would seem to shew that the emanations from small-pox patients may be carried for long distances through the air; and that the concentration of many small-pox patients in one locality in towns, as in small-pox hospitals, may cause the spread of small-pox amongst the inhabitants around, without any personal contact: and it has, therefore, been proposed, by eminent physiologists, to pass all the air from small-pox wards in towns through fire, in order to destroy the poison.*

Although Jenner made his great discovery long before the close of last century, viz.: that man can be protected against small-pox without himself becoming a source of danger to others, as had been the case with inoculation; it was not until 1840 that the first Vaccination Act was passed; and it was not until many years later that vaccination was made compulsory.

To those who recollect how large was the number of deaths from small-pox, and how dreadful was the disfigurement of those who had recovered from the disease, it is a matter of profound astonishment that the importance of vaccination, which is the only absolute safeguard, can be in any way doubted.

Through vaccination and re-vaccination, small-pox has been almost entirely obliterated as a disease in the German army, and largely in German cities.

But in England we have not been so careful in enforcing either vaccination or re-vaccination; and we have suffered even in recent years from severe small-pox epidemics.

There are some towns which, whilst neglecting vaccination, endeavour to protect themselves against the incidence of small-pox by measures of isolation.

The instance of London will explain my meaning.

London is a city in which efforts are made to enforce vaccination; but there is no central sanitary authority in London, and that, necessarily, leads to some laxity in practice.

There is, however, an authority charged with taking care of sufferers from infectious diseases among the pauper classes, viz.: the Metropolitan Asylums Board.

Under this body every case of small-pox, where the patient cannot be isolated in his own home, is at once removed down

* In this connection it may be observed that the most effectual method of destroying organisms and their spores or germs, is now ascertained to be by exposing them to superheated steam.

the river by ambulance steamers to hospital ships, situated in an uninhabited part of the Lower Thames; and there can be no doubt that, at the present time, it is largely owing to the rapidity of removal of the patients to a place from whence they cannot spread the disease, that London has been lately so remarkably free from small-pox.

Leicester, on the other hand, unfortunately opposes vaccination; it affords similar evidence of the advantage of careful and rapid isolation of the patients, but Leicester couples with isolation of the patients the isolation of those who have been in contact with them; and also endeavours to maintain an efficient sanitary standard in the population of the town. Yet the presence in Leicester of a large population unprotected by vaccination may some day cause it to be the scene of a bad epidemic.

Typhus Fever, which was a common and very fatal disease at the beginning of the century, is essentially associated with overcrowding and destitution.

It used to be the inhabitant of our jails, under the name of jail fever, which was of so infectious a character that on more than one occasion the judge, the jury, and the bar, have caught the fever from the prisoners in court. The old custom of placing a branch of rue on the desk of the judge at the assizes, arose from the supposition that the scent of rue would afford protection against infection.

Jail fever was frequent in over-crowded barracks and camps, and it was the permanent occupant of our towns and villages in those localities where houses were so densely massed together as to preclude the free movement of air in and about them, and where the dwellings were so overcrowded as to ensure the fouling of the air within them by the concentrated emanations of living bodies.

Typhus is essentially the disease of the pauper and badly housed elements of the community; but wherever it prevails it may be caught by those around, who are within the sphere of its influence.

In speaking of London in 1840, Sir John Simon says: "There were courts and alleys hemmed in on all sides by higher houses, having no possibility of any current of air, and (worst of all) sometimes so constructed back-to-back as to forbid the advantage of double windows or of back doors."

"There could be no through ventilation; and amidst it all there was a dense population of human beings with an atmosphere hardly respirable from its closeness and pollution." "Typhus," he added, "prevails there . . . not as an occasional visitor, but as an habitual pestilence."

Between 1856 and 1887, a sum of over fourteen millions sterling was devoted, by the Metropolitan Board of Works, to measures tending almost exclusively to the destruction of unwholesome house property; and to the opening up of wide thoroughfares and breathing spaces in crowded parts of the metropolis.

This is exclusive of the outlay in the erection of wholesome dwellings to replace unwholesome ones.

This latter work was almost altogether undertaken by bodies and individuals who had no access to the public purse, but whose private expenditure, on new dwellings, cannot have fallen far short of a similar sum.

The result is that where there were formerly 230 deaths annually from typhus, there is now only one death.

Whilst typhus fever was the occupant of jails, camps, and city dwellings, where misery and excessive crowding obtained, enteric fever, on the other hand, occurs alike in the crowded tenements of the poor and in the mansions of the wealthy—to which sewer-air has been laid on by ill-contrived arrangements—as well as in scattered rural districts, where the need for the proper disposal of excreta is not properly recognised.

The remedies required for the prevention of the one disease have little or nothing in common with those for the other; and whilst the removal of the conditions favourable to that form of filth which comes of air laden with the accumulated emanations of a crowded and destitute people has freed our towns of typhus, it is necessary for the prevention of enteric fever so to dispose of the excreta and other organic refuse of populations, as to prevent the possibility of their spreading poison either through water and food consumed or through air breathed.

The next of the preventable diseases to which I will allude, viz., scarlatina, has no such relation to water supply and drainage as have those other preventable diseases, of which typhus and enteric fever are types. During 1851–60, the deaths in England and Wales at all ages from scarlatina amounted to 88 per 100,000 living; in the next decennial period, 1861–70, the rate had risen to 97; but during the ten years, 1871–80, there was a substantial diminution, the rate standing at only 72.

From 1878, when the rate was 75 per 100,000 persons living, it fell, year by year, without interruption, till 1886, when it was in the proportion of only 22 per 100,000 living; but in 1887 the death rate from scarlatina rose to 28 per 100,000 persons living.

Up to a comparatively recent date all the more generally adopted means of prevention of scarlet fever were in one way or another included within such processes as had to do with the

isolation of the sick from the healthy, and the disinfection or destruction of such articles as were known to act as vehicles for the infection. Indeed, Sir Edwin Chadwick has persistently advocated personal cleanliness as a safeguard against the spread of infection from scarlet fever—that is to say washing the body from head to foot daily in tepid water, as a powerful factor of prevention against this disease; and he mentions the case of one of the Nightingale nurses who, during a twenty years' experience of attendance in scarlet fever cases, had not caught the infection, and who attributed her immunity to having washed all over twice a day, to having changed her linen daily, to having kept a current of fresh air always flowing through the room, and to having avoided ever drinking out of the glass used by the patient.

But the saving of life in recent years indicated in the above statistics, has, in the main, been brought about by epidemiological research, which appears to be gradually elucidating some of the methods by which the specific contagion of this disease may be multiplied and is communicated to man.

Stage by stage, we have gradually learned the existence of conditions favouring the spread of the infection which lay beyond the limits of the ordinarily-recognized means of personal inter-communication. And, in the prevention of scarlatina, it is probable that we shall, in the future, have largely to rely on the study of disease in the lower animals; for recent investigations appear to make it certain that the cow suffers from a disease of the nature of scarlatina, which is in some way communicable to man through the milk.

This knowledge carries the necessity of enforcing in our cow-houses and farm-yards those sanitary conditions of cleanliness and purity of air and water, which are essential to health in our own surroundings.

The etiology of diphtheria can scarcely be said to be as yet thoroughly understood, and possibly on that account its connection with the germ theory of disease has been the more readily accepted. It undoubtedly receives great development under those insanitary conditions which are involved in the proximity of decaying organic matter. It is eminently infectious. It operates more frequently in sparsely-populated country districts than it does in densely-inhabited towns.

It is stated to appear more frequently in October than in any other month; to prevail more frequently on clayey than on sandy soils; and especially to have a preferential incidence on families that have shown liability to throat affections.

Cholera is not so constantly with us; it appears at uncertain intervals.

The laws governing the spread of cholera are well-understood by sanitarians. The fact that cholera, like other infectious diseases, is a communicable disorder spreading from a focus of infection, has been long known; and the measures required to check its spread have been carried out for many years.

To quote the words of Sir John Simon, "cholera finds its home in excrement-sodden earth, excrement-reeking air, excrement-tainted water."

Remove these conditions, and you will stop cholera. In 1831 and 1848 there were serious epidemics of cholera in England. In towns where the same insanitary conditions had been allowed to continue, the epidemic attacked the same streets, the same houses, and sometimes the same rooms in both epidemics. The removal of insanitary conditions has prevented cholera from again obtaining a foothold in England, although in 1854 and again in 1866 this disease was epidemic in a less degree.

But it is a disgrace to England that we have allowed India to continue to be a hotbed of cholera for so long.

The whole experience of the sanitary measures which have been taken in India show that the prevalence of cholera can be controlled in that country in the same way in which it has been controlled in England.

At the International Congresses on Hygiene, the European nations have insisted upon maintaining a quarantine against vessels coming from India.

Quarantine is, no doubt, an unnecessary interference with trade, because in the face of good sanitary conditions cholera could not find a footing in the seaports.

The continental nations, however, prefer to retain insanitary conditions in their own seaports, and they therefore resort to quarantine. But when we complain, they point to Calcutta and Bombay as being ports where cholera is endemic, and they say—adopt those sanitary measures in India which you have adopted in England, and by which you have prevented cholera from finding a foothold on your own shores for so many years: protect Calcutta and Bombay against cholera by efficient sanitation, and we will take off the quarantine.

The following figures show that these zymotic diseases, which Dr. Farr has aptly called "filth diseases," have of late years been largely reduced by sanitary means:—

The deaths in England and Wales, from these zymotic diseases per 100,000 persons living, which in 1861-70 were 425, were reduced in 1881-87 to 245, whilst in London the deaths from zymotic disease, which in 1861-70 were 519 per 100,000, were reduced in 1881-87 to 313 per 100,000.

In this recapitulation of preventable diseases, I must not omit Phthisis. The Registrar-General says, that of all the causes of death which have a place in the bills of mortality, Phthisis is the one which carries off the largest number of victims.

In the 33 years between 1848—80, it is stated that 1,702,027 deaths were due to Phthisis. In 1887 the deaths from Phthisis amounted to 44,935, which is about 159 per 100,000 of persons living, and is indeed one-twelfth of the whole deaths for the year.

Phthisis has been defined by a recent French Commission to be "a parasitic disease, virulent, contagious, and transmissible from parent to child, caused by the microbes of Koch, which enter the system either through the alimentary canal in the food, or by the lungs, or the skin."

Dr. Thorne Thorne tells us that it accompanies a damp subsoil: it is largely encouraged by indoor occupation where there is absence of means for renewing the air. It levies its toll as much on the humblest cottage industry as on the highest development of our factory system; and it especially prevails where there is inadequate ventilation in and about dwellings, and in workshops in which the atmosphere contains particles of materials used in manufacturing processes; sedentary employment, and constrained positions preventing the due development of the bodily organs, are held to be important factors in assisting the development of this disease.

The progress of sanitation in the reduction of the level of subsoil water, the prevention of damp in dwellings, and improved ventilation in factories and workshops, appear to have had some effect in diminishing this disease. The number of deaths per 100,000, which in 1851-60 amounted to 268, were reduced in 1871-80 to 212.

This short summary of the conditions which affect these several diseases shows us that sanitation involves many factors.

The great improvement which has taken place in recent years, in the construction of instruments of precision, has enabled researches to be made which are daily opening out to us new views of the causes of disease.

We have learnt that, just as a specific organism causes fermentation in liquors, and manufactures for us alcohol out of sugar; just as others of these minute organisms are continually working to convert dead matter into some other form available to be taken up to promote life; so other organisms are present either as the cause or effect of certain forms of disease in animals and plants.

In speaking of diphtheria, Dr. Thorne Thorne tells us that

under certain conditions of evolution, some of these organisms may temporarily obtain a property by which they become infectious, whilst if deprived of the circumstances which favoured this development, they may again lose their infectiveness in the same way as special characteristics may be developed in higher plant life, and be as easily lost again.

The German physiologist, Koch, and others, have in recent years attributed cholera to the presence of a germ. Dr. Klein, who was sent out to India by the Government to examine the question, does not admit that the evidence of this is complete; and certainly at present we know comparatively little of the modes of operation of these organisms, but our knowledge is daily extending.

Whatever, however, may be the facts as to the operation of these minute organisms, their development would seem to require favouring circumstances. Their numbers would appear to increase with insanitary conditions. For instance, in the pure country air, very few microbes can be found in the atmosphere; whilst near the mouths of sewers or near decaying organic matter, the numbers of microbes and spores of fungi found are sometimes enormous. And recent investigations by Professors Carnelly and Bedson, would appear to show that the numbers of these organisms are largely increased in air which is contaminated by the respiration of closely-packed assemblies, particularly when their members are not cleanly in habits or in dress. But, on the other hand, it would seem that a healthy person may have the power to resist their attacks, and that it is mainly owing to lowered vitality resulting from heredity or engendered by insanitary conditions, or from other causes, that these organisms are enabled to obtain a foothold.

The conferences which have recently taken place at the International Congress of Hygiene in Paris, on phthisis, exhibit the danger against which sanitarians must guard in discussing these new discoveries.

The tendency would seem to be to attach more importance to the germ and to its modes of life than to the means which experience has shewn us will certainly limit its destructive power in human beings.

For instance, the discovery of the cholera germ could not, in any way, alter the nature and application of the general laws of sanitary science, as specially applied to the spread of cholera, or of that group of infectious diseases dependent on filth; although the knowledge which would inevitably follow the identification of a cholera germ, of its nature and mode of spread, of the conditions under which it undergoes alteration by temperature, soil, and season, would unquestionably lead to a more

specific application of means to ends than has hitherto been the case.

Whilst, however, it is essential to adopt all known means of protection against imported diseases, such, for instance, as vaccination in the case of small-pox, as isolation of the invaded individual, and as the destruction of the secretions by chemical agency, the prevention of disease aims at something higher. It aims at placing a healthy population in conditions of air, water, warmth, food, dwelling, and work, most favorable to their development. The vigour of their own life is the best security men have against the invasion of their organisation by low corpuscular forms of life: for such the propagating matters of zymotic diseases may be held to be, and, let me add, in the words of Dr. Farr:—"Vaccinate by all means; but at the same time provide streets, spaces, dwellings, water, drainage. Do not leave the dirt in rookeries, in pits, in dunghills. What are municipal bodies, town councillors, aldermen, mayors, provosts," and we may now add county councils, "good for, if they cannot, by administrative measures, displace rookeries by healthy habitations; supply the people with water and with the means of 'cleanliness,' which stands, proverbially, 'next to Godliness?'"

Whatever may be the facts as to the effects produced by these organisms, we do know that the prevalence and progress of certain diseases can be increased or modified by the surroundings in which a population is placed, and by the conditions under which it lives.

For these reasons, if you wish to guard yourself against these diseases, you cannot avoid benefiting others at the same time.

In that aspect improved sanitation may be said to be unselfish. It compels you to confer those benefits upon others which you are endeavouring to confer upon yourself.

Hence sanitation necessarily means the increased well-being of the people, and especially of the lower classes.

Well-to-do people cannot adopt sanitation for themselves alone. If an epidemic breaks out in a village or a town, however carefully you may guard yourself, however splendid the house in which you live, and however you may strive to shut yourself up in it, you stand a chance of catching the disease.

Epidemics can only be prevented by making the whole population sanitary, and by removing from them all disease causes. That means that they must be in a position of well-being and comfort; you must not allow over-crowding in the houses or cottages near you; you must see that houses and cottages near you have good through ventilation and circula-

tion of air around them; you must see that refuse of every sort is removed away from the inside of every house and cottage, and from their vicinity, before it has had time to decompose and pollute the soil and the air; you must see that each house and cottage is supplied with pure water; you must see that the food is not adulterated or impure, and that the milk is not infected; you must see that the level of the subsoil water is lowered so as to prevent damp, and thus check those diseases which are favoured by damp. But to ensure a healthy population, we require something beyond their material well-being: we require a control over the use of intoxicating drinks, and the cultivation of habits of order, sobriety, cleanliness, and prudence; and, above all, of morality.

The facts which I have mentioned as to the causes of these preventable diseases, show that the material insanitary conditions from which we suffer arise very largely from the emanations which living beings throw out of their own bodies, and hence that one great principle of sanitation is to get rid of refuse matter.

In the case of the air in our dwellings, we throw out from our bodies in breathing impurities into the air; and fresh air is necessary to dilute this refuse, and to assist its conversion into innoxious forms of matter. We therefore prohibit the building of houses back to back; we recommend windows capable of opening in every room—light assists cleanliness, darkness means dirt.

Similarly, if we allow the refuse from our rooms, our kitchens, and our stables, to accumulate in, or in close proximity to our dwellings, the emanations from it poison the air around. We therefore inculcate covered metal boxes to hold the refuse which should daily be removed from them to a locality away from the vicinity of the houses, whether in town or country.

Accumulations of organic matter should never be allowed to remain stored up amidst a town population; they should be removed daily outside the town. In large populations, the most effectual way of preventing such refuse from being injurious is to burn all which cannot be utilized as manure.

In the removal of excreta from houses, the use of cesspits—whatever be the material of which they are constructed, except metal—will infallibly gradually pollute the surrounding soil. Therefore cesspits should never be permitted to exist any more than should manure or ashpits sunk into the ground.

In country districts this class of refuse should be mixed with the soil and used in gardens or fields as rapidly as possible.

There is always liquid refuse to be disposed of, and in your villages and country districts you must so remove this that it

shall not run into the ponds from which the cows who supply you with milk are drinking. You must see that it does not flow into your wells over the surface, or penetrate into them underground. Nor must it pass into your steams and rivers until it has been freed, by some form of land filtration, from the poison which your refuse matter has put into it.

In the drainage system for a town, you must remember that such a system, to be complete, must embrace, not only the sewers and the house connections, but also the paving of your streets and yards.

If you adopt sewers for domestic water separate from your street drains, you yet must make provision for both, and if you form your streets of soft materials which pass into your drains, you will have deposits, which will cause not only interruption to the flow of sewage, but danger to health from the putrefactive gases which they would engender.

Therefore the road and yard surface is an important feature in the drainage arrangements of every town.

Having made your drainage system perfect in your town, you have still to dispose of your sewage in such a manner as not to injure streams or rivers.

This question has been discussed and rediscussed for many years without much material advance having been made in the conclusions arrived at.

It may probably be summed up thus—that the most practical method of dealing with the sewage of inland towns is, after causing the solid parts of the sewage to be deposited, by some form of precipitation, to run the liquid over land covered with growing plants.

I said at the beginning of this address that I could tell you little that was new. And all these suggestions which I have just recapitulated have been made over and over again. You will probably each of you say you know all this; but if so, why is it that the suggested precautions are not invariably taken? Why does so much defective sanitation exist? The fact is, the principles of hygiene—the simple rules of a healthy life—should be inculcated on children from their earliest years; and when the children so educated grow up we may hope, and then only, that preventable diseases will be largely diminished.

As bearing on this question I would here quote a remark made in the Annual Report of the United States' Central Education Commission:—

"It is easy to lay down instructions on paper, but they will be of little value if the desire to apply them at the proper moment be absent. We can only make useful citizens by preparing them from infancy for the duties they are to perform.

From the moment when a child enters school his physical and moral instruction should be pursued rationally and methodically. The child should be at once placed in possession of all his faculties, and they should be developed; his nature should be encouraged, his physical instincts cultivated; his sense of symmetry, harmony, and judgment, and especially his faculty of imagination, should be cultivated; he should be made familiar with the habits of those with whom his life will be spent; he should be taught truth, courtesy, justness, indulgence, and usefulness; he should be inspired with purity, beauty, right conduct, and nobleness of character. Having thus prepared him morally and mentally, let him seek out and create for himself his future career."

You will, perhaps, say, what is the national advantage of sanitation when we see our population daily increasing, and labour so plentiful that, in some trades, low wages result; and why should we, by removing preventable causes of death, assist our population to increase faster.

This argument reminds me of an extract from an essay published in a magazine called *The World* in 1755. The essayist says that "prior to the introduction of small-pox inoculation, London, thanks to the fatal ravages of small-pox, was tolerably roomy; people preferred to stay at home in the provinces rather than come to London and catch the disease. But now, thanks to inoculation, this danger has disappeared, and London is most inconveniently crowded.

"This inconvenience has, in a great measure, been hitherto prevented by the proper number of people who were daily removed by the small-pox in the natural way, one at least in seven dying, to the great ease and convenience of the survivors, whereas, since inoculation has prevailed, all hopes of thinning our people in this way are at an end, not above one in 300 being taken off, to the great incumbrance of society."

This was undoubtedly a strong way of stating the case. But the increase of our population is a very serious question.

The first effective census was taken in the year 1801, and the population of England and Wales then numbered 8,892,536. In 1881 it had nearly trebled, and numbered 25,974,439.

The area of England and Wales amounts to 37,239,351 acres. Thus there are nearly $1\frac{1}{2}$ acre to every inhabitant.

The Registrar General further shows us that whilst during the ten years, 1871–80, the natural increment of the people, *i.e.*, the excess of births over deaths, has been at the rate of 15·09 per cent., the diminution by the excess of emigration over immigration has caused a loss of only 0·73 per cent.; and he states that if the rate of increase which has prevailed during the last half-century continues, the population will be doubled by the year 1936.

When we consider that in our expanding trade, the matters which we export are things that we cannot eat, and that our imports at the present time represent fully 40 per cent. of the food required for the daily sustentation of the people, and that this food is imported from abroad, it certainly behoves our statesmen to consider seriously in what way the land in this country can be more effectually utilised for producing food than is now the case; and how the vast and sparsely peopled colonies which England possesses may be made more subservient than they now are to promoting the welfare of the empire.

Whilst, however, it is impossible to ignore the vast importance of this question, we must bear in mind that it is essentially our duty and our advantage to see that the capacity of the people for working and for producing the necessaries of life shall not be diminished by sickness or a low condition of living.

We have not yet reached the limit at which the people of this country are unable to obtain employment. Up to the present time at least, improved sanitation has been accompanied by an improved condition of the working classes.

We talk of the vast progress which we have made during the present century, and it is most interesting to contrast the condition of things which existed between 1830 and 1837, with that at the present time.

If you read the report of the Poor-Law Commission of 1842, you will see that, in those days, the number in receipt of parochial relief was large. The people were sickly, they were badly housed, frequently in most wretched cottages; supplied with little water, and that little often bad; the refuse was allowed to accumulate, in and around streets and cottages; employment was scarce, food and clothes were dear.

Now, although the number of the people is double what it was in 1831, employment is plentiful; the people are better housed, better clothed, and better fed.

It is difficult for persons, who were not alive in those days, to realise how completely the steam engine, the railways, and the telegraph, have altered the conditions of life. But if we look forward, we may safely say that, great and numerous as have been the inventions which have changed the face of the world during the last half century, the inventions and changes which the next half century will witness will probably far transcend them in interest and in importance.

Up to the present time employment seems to beget employment, and there is no apparent reason why those conditions should change, for the present at least.

Let us now consider what the removal of the preventable causes of death means.

The following table from the supplement to the 35th Annual Report issued from the General Register Office, shews what were the probabilities of living, of the male population, from age to age, if the deaths from preventable diseases were excluded.

ENGLAND AND WALES.—*Four Orders of Life Tables for Males (calculated from the Facts Recorded during the Ten Years* 1861—70), *shewing the effect of the Exclusion of Deaths from* (1) *the Principal Zymotic Diseases;* (2) *Phthisis; on the Probabilities of Living from Age to Age.*

Age x.	Living at Each Age x.			Dying in Each Interval of Age.		
	To Die of All Diseases.	The Principal Zymotic Diseases Excluded.	Phthisis Excluded.	Of All Diseases.	The Principal Zymotic Diseases Excluded.	Phthisis Excluded.
0	510,622	510,622	510,622	142,805	99,272	140,977
5	367,817	411,350	369,645	14,688	7,479	13,997
10	353,129	403,871	355,648	7,788	5,931	6,798
15	345,341	397,937	348,850	10,474	9,533	6,857
20	334,867	388,404	341,993	13,854	13,566	7,725
25	321,013	374,838	334,268	30,258	31,164	18,868
35	290,755	343,674	315,400	36,617	39,107	28,010
45	254,138	304,567	287,390	44,313	48,846	40,798
55	209,825	255,721	246,592	58,981	67,133	63,367
65	150,844	188,588	183,225	73,435	87,412	87,279
75	77,409	101,146	95,946	59,583	76,002	73,695
85	17,826	25,144	22,251	17,037	23,918	21,305
95	789	1,196	946	780	1,187	937
105	9	9	9	9	9	9

The Table may be read thus:—Of 510,622 boys born alive, 321,013 attain the age of 25, of whom 30,258 die in the ten years following.

Exempted from attack by miasmatic diseases, 374,838 would survive to the age of 25, 31,164 dying in the next ten years.

Let us, as an example, apply this Table to the population of Worcestershire, where the number of male births in 1887 was 6,154. Assuming the same rate of incidence of zymotic disease to continue to prevail, as is shown in this Table, the number of these male children who would be alive at the age of 25, that is to say, in 1912, when a labouring man attains his full earning power, there would be about 649 more male persons living, if preventable zymotic diseases were abolished, than is now the case; at the age of 35 there would be 638 more; and at the age of 45 there would be about 608 more males living; and at

the age of 65, that is to say, in 1952, when a man's working power may be assumed to be on the decline, there would, if you abolish preventable diseases, still be about 455 more males alive who had been born in the year 1887, than would be alive assuming the mortality of Worcestershire, both general and zymotic, to be similar to that of England and Wales during the period in question.

The community may thus be assumed to have had the benefit from the capacity for work of these extra persons during the 45 years. The money value of this may be roughly assumed from a calculation of Dr. Farr's, in a paper published in the Statistical Society's Proceedings in 1853, on the equitable taxation of property. He there gives the value of high agricultural wages, and of moderate professional incomes.

The value of the future wages of a labourer, at the age of 20, on good wages, is there stated at £637, and the value of the future income of a professional man, earning the moderate income of £288 a year, is stated to be £5,329 at the age of 25, and £6,038 at the age of 40.

If we assume that one-twentieth of the males were of the class above that of labourers, and that only one-fourth of the labourers earned good wages, the capitalized value of the earnings of the larger number of males who would be kept alive, owing to the abolition of zymotic diseases, out of those born in each year, who would otherwise have died, would be not less than a quarter of a million of money; and this would be repeated annually.*

These figures show that there is a direct money value to the community in preserving the health and extending the duration of healthy life of those who live in the community, because it extends their power of labouring and of adding to the wealth of the community; and, moreover, this money saving far exceeds any outlay which would be necessary to remove sanitary defects existing in the county.

In a diminished death-rate there is also the direct saving from diminished funerals, which has been estimated at an average of £5 a funeral; thus the saving of life arising from absence of death from zymotic diseases in males and females, would amount upon the annual death-rate of Worcestershire to above £5,000 a year. But this does not represent the whole saving. Each death from one of the preventable diseases represents many cases of sickness which do not end in death, but which cause a serious loss to the community. The loss from sickness

* Dr. Farr made a later estimate, in which he put the average *net* value of the whole community, men, women, and children, at £159.

arises partly from the loss of earnings, and, in the younger members of a family, from the expense which the sickness causes, from loss of time and otherwise, to the other members of the family. Thus the real meaning of a diminished death-rate is an increased wage-earning power in the community, as well as the diminution of that waste of power which occurs in individuals from sickness and inability to work, and which is to some extent represented by the money spent, owing to that sickness, upon medical advice, upon hospitals, and upon other forms of charity, instead of upon some reproductive service.

In addition to this money loss, consider the loss of happiness from preventable death and sickness. The child is removed in whom the hopes of the father and mother are centred. The mother is snatched away on whom the bringing up of the children so largely depends. The father dies, whose labour has supported the family in comfort, and whose death leaves them to sink into poverty. In addition to this, individual happiness, and the power of enjoyment, depends on health: without health we cannot exert our full energies, we cannot help our neighbours, we cannot fulfil our own daily duties; yet it is upon these matters that a large part of the real happiness of life depends.

I think that it will be interesting to you to see how the preventable diseases in Worcestershire compare with the total in the whole country. I, therefore, asked my friend, Mr. Mundy, of the General Register Office, to prepare for me tables which exhibit the sanitary condition of the registration districts of Worcestershire, compared with that of England and Wales and London.

Those tables are given on the following page. The information which they afford shews that whilst Worcestershire may be classed as a comparatively healthy county, there still exists, in the county, a large amount of preventable disease, which it is the duty of the various sanitary authorities to fight with and suppress.

The health of a district, as measured by the published death-rate, is made up from the average of a number of details; and whilst in parts of each district there are healthy localities, in other parts there are unhealthy places. It is these unhealthy localities which should be attacked: and no sanitary authority should be satisfied until every portion of the district is equally free from preventable disease.

Average Annual Mortality per 1000 *in the Population, Decennia* 1851—60; 1861—70; 1871—80; and 1881—87.

Registration District, &c.		Mean Population.	All Causes.	The following principal Zymotic diseases.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Whooping Cough.	Fever.	Diarrhœa, Dysentery, and Cholera.
England and Wales.	1851—60	18,996,916	22·17	4·11	0·22	0·41	0·88	0·11	0·50	0·91	1·08
	1861—70	21,389,245	22·42	4·25	0·16	0·44	0·97	0·18	0·53	0·88	1·09
	1871—80	24,313,348	21·27	3·40	0·24	0·38	0·72	0·12	0·51	0·49	0·94
	1881—87	*27,151,444*	*19·22*	*2·45*	*0·06*	*0·44*	*0·38*	*0·15*	*0·45*	*0·25*	*0·72*
London..	1851—60	2,583,112	23·63	5·07	0·28	0·53	0·91	0·08	0·87	0·85	1·52
	1861—70	3,029,125	24·31	5·19	0·28	0·56	1·13	0·18	0·88	0·88	1·28
	1871—80	3,535,372	22·37	3·82	0·44	0·51	0·60	0·12	0·81	0·36	0·98
	1881—87	*4,023,456*	*20·32*	*3·13*	*0·17*	*0·62*	*0·37*	*0·22*	*0·70*	*0·23*	*0·82*
Worcestershire.	1851—60	276,844	20·24	3·24	0·21	0·41	0·61	0·12	0·27	0·76	0·86
	1861—70	315,614	20·09	3·63	0·15	0·33	0·94	0·16	0·33	0·71	1·01
	1871—80	359,643	18·95	2·89	0·19	0·26	0·71	0·15	0·33	0·36	0·89
	1881—87	*401,318*	*17·12*	*2·00*	*0·02*	*0·37*	*0·33*	*0·10*	*0·31*	*0·27*	*0·60*
Stourbridge.	1851—60	63,038	22·76	4·58	0·41	0·75	0·63	0·10	0·34	1·02	1·33
	1861—70	71,055	22·25	4·74	0·31	0·44	1·32	0·11	0·42	0·86	1·28
	1871—80	76,491	21·42	4·12	0·54	0·45	1·13	0·09	0·40	0·50	1·01
	1881—87	*81,725*	*19·11*	*3·01*	*0·03*	*0·57*	*0·71*	*0·07*	*0·55*	*0·32*	*0·77*
Kidderminster.	1851—60	31,612	21·33	3·50	0·15	0·50	0·73	0·10	0·22	1·00	0·80
	1861—70	32,628	20·69	3·88	0·13	0·41	1·12	0·14	0·27	0·76	1·05
	1871—80	37,945	19·25	2·90	0·04	0·35	0·68	0·15	0·32	0·35	1·01
	1881—87	*43,173*	*16·09*	*2·48*	*0·04*	*0·44*	*0·33*	*0·13*	*0·22*	*0·54*	*0·78*
Tenbury.	1851—60	7,207	17·25	1·83	0·03	0·22	0·42	0·24	0·24	0·39	0·29
	1861—70	7,597	18·23	1·86	0·08	0·07	0·51	0·09	0·36	0·54	0·21
	1871—80	7,708	18·21	2·07	0·08	0·22	0·52	0·14	0·26	0·36	0·49
	1881—87	*7,512*	*14·68*	*1·20*	....	*0·13*	*0·13*	*0·11*	*0·27*	*0·19*	*0·37*
*Martley	1851—60	14,455	17·86	2·03	0·03	0·08	0·69	0·14	0·17	0·62	0·30
	1861—70	15,703	17·19	2·42	0·03	0·13	0·77	0·16	0·22	0·58	0·53
	1871—80	16,350	16·55	1·58	0·07	0·17	0·28	0·13	0·18	0·26	0·49
	1881—87	*16,419*	*15·44*	*1·04*	*0·01*	*0·10*	*0·32*	*0·06*	*0·16*	*0·13*	*0·26*
*Worcester.	1851—60	29,323	23·12	3·49	0·22	0·33	0·66	0·03	0·37	0·69	1·19
	1861—70	31,693	24·75	4·87	0·22	0·41	1·27	0·14	0·42	0·86	1·55
	1871—80	32,355	23·13	3·48	0·20	0·39	0·54	0·10	0·26	0·38	1·61
	1881—87	*32,254*	*23·86*	*3·33*	*0·00*	*0·33*	*0·20*	*0·06*	*0·32*	*0·30*	*1·12*
Upton-on-Severn.	1851—60	19,540	20·02	2·29	0·04	0·12	0·48	0·25	0·25	0·64	0·51
	1861—70	22,192	19·62	2·03	0·08	0·16	0·47	0·17	0·16	0·53	0·46
	1871—80	23,305	18·45	1·10	0·04	0·07	0·22	0·15	0·14	0·15	0·33
	1881—87	*23,188*	*18·33*	*0·92*	....	*0·09*	*0·06*	*0·13*	*0·17*	*0·23*	*0·24*
Evesham.	1851—60	14,615	18·75	2·83	0·05	0·49	0·64	0·11	0·31	0·70	0·53
	1861—70	15,195	17·88	2·70	0·02	0·16	0·62	0·18	0·26	0·55	0·91
	1871—80	15,447	17·42	1·89	0·06	0·08	0·31	0·30	0·23	0·34	0·54
	1881—87	*15,157*	*15·49*	*1·39*	....	*0·25*	*0·12*	*0·08*	*0·20*	*0·29*	*0·45*
Pershore	1851—60	13,709	17·49	2·02	0·09	0·18	0·37	0·04	0·20	0·42	0·72
	1861—70	14,004	17·34	2·09	0·06	0·16	0·54	0·19	0·13	0·39	0·62
	1871—80	13,851	16·76	1·80	0·02	0·12	0·48	0·22	0·17	0·20	0·59
	1881—87	*13,376*	*16·78*	*1·32*	....	*0·22*	*0·18*	*0·05*	*0·28*	*0·17*	*0·42*
*Droitwich.	1851—60	18,721	18·14	2·36	0·14	0·21	0·57	0·17	0·18	0·51	0·58
	1861—70	20,866	18·67	3·01	0·12	0·24	0·79	0·10	0·29	0·51	0·96
	1871—80	24,261	17·26	2·10	0·08	0·14	0·48	0·14	0·29	0·28	0·69
	1881—87	*27,385*	*13·91*	*1·38*	*0·03*	*0·21*	*0·27*	*0·10*	*0·17*	*0·25*	*0·35*
Bromsgrove.	1851—60	25,514	20·38	2·96	0·30	0·35	0·67	0·06	0·21	0·64	0·73
	1861—70	27,695	21·17	3·68	0·06	0·47	0·68	0·19	0·34	0·99	0·95
	1871—80	30,458	19·39	3·18	0·11	0·23	0·88	0·14	0·34	0·43	1·05
	1881—87	*32,912*	*17·10*	*2·02*	....	*0·56*	*0·24*	*0·06*	*0·26*	*0·20*	*0·70*
King's Norton.	1851—60	39,110	17·12	3·06	0·18	0·36	0·58	0·19	0·27	0·71	0·77
	1861—70	57,076	16·93	3·44	0·10	0·32	0·83	0·23	0·39	0·59	0·93
	1871—80	81,472	16·51	2·81	0·11	0·18	0·74	0·19	0·42	0·33	0·84
	1881—87	*108,217*	*14·65*	*1·68*	*0·02*	*0·32*	*0·23*	*0·15*	*0·28*	*0·18*	*0·50*

NOTE.—The Rates for 1881-87 are calculated on the assumption that the Rates of increase or decrease of the population in the respective districts that prevailed between 1871 and 1881 had been maintained since 1881. This is in some cases doubtful, but there is no means of making a better estimate.

* The recent alteration of boundaries of the City of Worcester alter some of these figures.

In every locality where we find a death-rate of above 16 per 1,000, we may be sure that there is a margin upon which we can work.

When we consider the enormous advantage to the community, both pecuniarily and morally, of diminished death-rates and diminished sickness; when we consider that this improved condition can be obtained by carefully enforcing laws which already exist as to the fitness of the dwelling, the number permitted to occupy it, the maintenance of cleanliness in it and its surroundings, the intelligent examination of those conditions which may pollute the air, the water, or the soil; and when we consider the importance of protecting the purity of the supplies of food; is it not a matter of astonishment that so little care is taken to obtain skilled officers to perform the duties of supervision, and especially that so little consideration is given to the importance of remunerating them adequately for the knowledge which they have been obliged to acquire in order to fit them for the laborious duties which they have to perform.

The prevention of disease is a different function from the cure of disease; and it is scarcely compatible with the requirements of professional avocations that the persons charged with watching over the prevention of disease should be engaged in private practice.

The Medical Officer of Health ought to give his whole time to his duties. If he is to perform these duties efficiently, he must have devoted many years and much attention to the acquirement of scientific knowledge, and he must have learned how to apply that knowledge to practical sanitation. You cannot obtain these qualifications unless you are willing to remunerate your medical officers adequately, and to give to the position permanence and importance.

Similarly the Sanitary Inspector, or the Inspector of Nuisances, who is the eye and the right hand of the Medical Officer of Health, must have a certain amount of scientific knowledge, combined with much practical experience, if he is to exercise his duties effectively.

The possession of these qualifications should be made a necessary contingency of the appointment of every Sanitary Inspector, and these qualifications can only be obtained provided you adequately remunerate your Sanitary Inspectors.

At the present time, when County Councils have had placed upon them the supervision of the sanitation of counties, it is especially necessary that they should take an enlarged and comprehensive view of the duties so laid upon them.

I have endeavoured to show you that so far as money is concerned, a diminished death-rate from preventable disease, and diminished sickness, means an actual pecuniary gain to the community; but you should consider also the moral side of the question. The healthy body is the necessary casket for the healthy mind, and in order that the nation may advance in education, in sobriety, in morality, and in all those qualities which go to form the true happiness of the people, you should direct all your efforts to abolish preventable disease, and to carry sanitation into all your towns and villages.

SERMON

By the Very Rev. The Dean of Worcester.

Preached in Worcester Cathedral, September 27th, 1889.

Exodus xx. 12.—"The Land which the Lord thy God giveth thee."

Fair, and rich, and well peopled; nobly governed, and very willing to be governed; the manifold factory of the world, its market, its exchange, and its coinage; the home of a Colonial Empire, and the throne of a score of Indian territories; the freest, the purest, the godliest race on God's earth—this is the land which the Lord thy God hath given *thee*.

Would it not be well to celebrate a yearly Eucharist, and bring each of us his offering, all for this alone? Each of us his offering,—even the use of the gift which God hath given us for our welfare and for His service. For it is a *ten-stringed* harp that our hand is holding, and our prayers are held in a *golden* bowl.

But look again—some of our ten strings are hurt, so our harp cannot give out all its music. Let me take up some of those frayed and broken chords and show you them, here in the Presence of God, here where He helps us to mend them.

I pray you to look at them carefully; you who have come from north and south to the midland to bend over the sorrows of England, and to lay your gifted hand on her leprosy; to you who have sat for four days with the spirit of wisdom and understanding, the spirit of council and of might,—aye, and not without the spirit of the fear of the Lord, fearing for great laws that are broken, fearing for death daily conquering where he might be conquered, and lives blighted which might be both blessed and blessing.

I.—The Chord of the Air.

For a heavy cloud rests day and night over the towns of the land which the Lord our God has given us, an earth-born cloud, not like that sign of God's presence and means of His guiding by which Israel walked of old through the Red Sea to the land which God had given them; but like the other side of that cloud which overshadowed and darkened the chariots of Egypt, and ruined all their glory. To you it is given to lift this cloud, and let in light and gladness, and the seven rays of a blessed sunshine into the streets and lanes of the city, for the saving of fuel and for the brightening of life.

A generation ago a manufacturer of Leeds was saving

15 per cent. by his consumption of smoke, yet the cloud is quite as heavy that hangs this afternoon over Leeds. In Newcastle Lord Armstrong burns the smoke of his blast furnaces, but few follow his lead, or grieve over their pollution of the breath of life.

Individuals then have failed, and the trust of fresh air and refreshing breezes has been committed to your Society, that you may purify public opinion, and that it may purify the public atmosphere.

Nor shall you stop till you have opened the window of heaven to every cottage room, and brought the breeze of the ocean and the breath of the mountain to fan the spark of life in every child of our race.

II.—The Chord of Pure Water.

Worse than the blemish of the air is the darkening of the sweet waters of the land which the Lord our God has given us. Water is a special gift to England—the rains that water the earth, water our pastures with a full cup, a cup of blessing, till our fields are the joy of man and beast; and the emerald that is the rainbow over the Throne of God (Rev. iv., 3,) lends its color to the grass of all our hills and dales.

But no rivers are so black as the streams of our land. "Streams," this is no name for the half liquid mud—black, foul and deadly—that fill the channels of those river beds where I caught trout and grayling in my boyhood.

Our Corporations have tried their hand, but Corporations are partly bounded by their borough limits, and their members have many interests to consider; Government has tried its hand, but in this thing the Crown has only power without knowledge.

And now we come to you, to whom knowledge of the secret things of God's nature is given, and the laws of the Most High are revealed; we come to you, whose kingdom, so far as it is natural and physical, knows no earthly bounds; to you, whose only interest is to give a cup of pure water to the children of the race, and to cleanse the waters that wash us.

Give us back, if you can, we cry, give us back the rivers of England, and the fountains of the land which the Lord our God has given us.

Aye, and let the water be not only clean, but sweet and pleasant. Rome was watered, not only by the pure streams that descend from the Alban hills, but they led the Aqua Marcia into their fountains, that delightful water that tempts you to drink it, the cup which the Roman citizen has chosen for 2,000 years before the vines of his Southern hills, to take their place or to temper their dangerous fire.

III.—The Chord of Pure Earth.

For an enemy is not satisfied with the sickness he has emptied into our air and our water; the Earth which our God blessed as He made it, Mother Earth herself is polluted, and the waters that leave our towns are more deadly than those that reach us; a dangerous fire floats down our deep broad drains, and the streams whose source is in the cesspool and the gutter and the conduit; these waters of death, whose gases are the breath of the grave, whose bed is the very bed of sickness, whose heat is the fire of fever. Heal those waters also, we pray you.

The land is accursed, its smell is not that of a field which the Lord our God has blessed. God gave to the Earth the virtue of sweetening all that it touches, and purifying the foul, and transfiguring our very refuse into fertility; but the salt has lost its savour because we have laden it with a burden that it cannot bear. And yet even now God has provided a remedy for every ill; somewhere in this great treasury of a world He has stored the virtue that may make the bitter water sweet, and the poisoned earth to be "a field of offerings;" it may be that the component parts of this medicine must be brought together from east and west, and gathered only by the hands of the wise, and mixed by men who have hearts as noble as their brains, and dispensed with reverence to Him Whose they are and Whom they serve. If you do not know how to help us, if this thing is still hidden from you, ask Him who has given you the divine desire to bear the infirmities of others, ask Him as *children* and you shall come to us as *men*, for men have constantly learnt things on their knees, that no book knows, and nature has failed to tell them.

So, when your gifts have descended like an angel into the pool, the sick man will take up his bed and walk; the outskirts of the towns, into which all England is gathering, shall be healed of their plague, and we shall rejoice again in the land which the Lord our God has given us; aye, the valleys shall laugh and sing.

There is a legend they love to tell in my own county of a dragon that wasted the fair Chase of Wharncliffe, devoured children, and saddened all the land. So the people cried for help, to God and man they cried, and God sent a hero who slew that dragon, and delivered the people and their homes.

I take it the thing is a myth—*i.e.*, an outward form to hold and give a truth worth having. A plague laid low the inhabitants of that Chase, or its undrained marshes slew their children before their time, till some lord reclaimed the land, or some gifted physician stood between the living and the dead.

Will your Institute be the Hero we want to-day? Will you go forth with the sword and shield you have forged in your crucible or laboratory, and do our battle with the dragon that devours us?

Indeed, it needs the real quality of the hero, his sense of a mission, his readiness to sacrifice himself for the common good; and you know the hero was a man born of the gods, half his nature descended to him from an immortal and heavenly parent. And so it is to-day. Science is cold, and something of the love of men must warm it. An eye that sees a look of the Cross in each weak and suffering person, as well as an eye that sees unknown virtue in some chemical, or undreamed-of power in some refuse by the wayside.

This is the essential nature of the hero of all times—kinship to God, union with our Lord, a sense that he is working *with* God, *for* God, *to* God; a sense that grows by use, and makes his mind reverend, and his skill sacramental, and his life an offering in union with the offering of Christ.

Therefore you come to your Cathedral as the Alpha and Omega of your Congress; you enfold your work in worship, and your work is part of your Faith.

Let me quote some of your own words that you have spoken this week:—"The sanitarian has long associated dirt with disease." What is this but the underside of the old Christian saying, "Cleanliness is next to Godliness." If one saying be true, the other holds equally good. But two witnesses are better than one, and in their undesigned coincidence the kinship of Religion and Sanitation is traced to a common Father.

Here is another sentence from your address of last night:—"But to ensure a healthy population we require something beyond their material well-being. We require a control over the use of intoxicating drinks, and the cultivation of habits of order, sobriety, cleanliness, and prudence; and, *above all, morality.*"

Aye, morality is a great law, to which other laws, as those of health, are subject. And yet morality is only a law; it can only command and forbid, and exact its terrible penalty when we rebel. But Christianity is power, enabling us to obey, helping us to fulfil the inexorable law, and finding a remedy when we repent of its breach.

Then shall men rise up and bless you, for you shall have given them both power and cause of blessing.

And you, with the many you have helped, shall often kneel together to praise and worship and give your gifts again to God, in some fair Cathedral, or in the little shrine of each man's own heart, or in the Church of those who have been saved, both in body and soul, in the Holy Land which the Lord our God has yet to give us.

MISTAKES ABOUT HEALTH.

LECTURE TO THE WORKING CLASSES,

By Professor W. H. Corfield, M.A., M.D.,

Saturday, September 28th, 1889.

Professor Corfield said: Mr. Mayor, ladies, and gentlemen, I propose in the short time that is allotted to me to speak to you about mistakes made during our lives concerning our health. A pessimist philosopher has said "Youth is a folly, middle age is a mistake, and old age is a regret." Let us hope that that at any rate is not always true, and let us try by seeing how we may best keep our health, that most valuable possession we have—let us try to prevent that saying from being true in our case.

We will then take shortly the different periods of life, and see the mistakes that are either made for us or that we make for ourselves during those periods. First, there is the period of infancy. Now, the first great danger to a young child is from the external cold, but as a rule mothers are too careful of their young children to expose them too much as babies to the external cold, so I pass over that for the present, though it would be a great danger to infants if they were exposed to it, and I will come back to it in the next stage. After that—after exposure to cold—the great danger to infants is from improper feeding. There is only one food which is fitting for the nurture of an infant—the food provided for it by nature, which contains all the substances that are requisite to nourish a young animal mixed in their proper proportions. That food of course is milk. Instead of milk or milk and water all sorts of things are given as you know to young infants. In the first place a large number of mothers give their young infants tea. It has been shown perfectly clearly by investigations which have been made into the lives of young children in the colliery districts, that the growth of infants and young children is stunted to a most remarkable extent by the practice which their mothers have of giving them tea instead of milk. Another thing, as I daresay many of you know, is that all sorts of preparations and

starches are given to infants very often without any milk; for instance, boiled bread. Boiled bread is a very common thing indeed for mothers to give to young children. Now, until infants begin to cut their teeth, and until—which happens at the same time—until the salivary glands, the glands which secrete saliva, which is the substance in the body that digests starch, begin to act, until that is the case, these young children can no more digest boiled bread than I can digest this pocket-handkerchief. I might mention a great number of other things that are given to young infants instead of their proper food; but they are well known to you, and it is not necessary.

Well, the results of giving to young infants foods that they cannot digest, the results are disorders of the digestive apparatus, sickness, vomitting, diarrhœa and so on, and death—death in a large number of instances.

The disease which carries off more young infants than any other, more than zymotics or acute fevers, is the summer diarrhœa of infancy, and one of the most important causes of it is unquestionably improper feeding, feeding with articles not containing milk, with articles that are not milk, also, when milk or water is used as food, feeding with unclean feeding appliances. These are the causes of the diseases that cause the deaths of the greatest number of infants. I was going to say there is a still worse result. Perhaps you will say there cannot be any worse result. But there is a disease commonly known on the Continent as the English disease, "a disease which is known to most of our large towns, the disease called rickets." Now I have the great authority of Sir William Jenner, one of the greatest authorities on children's diseases that can possibly be quoted, for saying that rickets is almost always caused, that the chief cause is improper feeding, and that the chief cause of improper feeding is ignorance, and that if mothers knew that it was not possible for their infants to digest such things as they gave them there would be no more rickets.

Now, I must not pass over infancy without mentioning one thing. Perhaps you do not all agree about it, though I hope to-night you will all agree about it. There is a certain class of diseases which are especially and peculiarly the diseases of infants, or young children and infants; those are the majority of communicable fevers which are diseases, and if a person has once he seldom has again during the rest of his life. Now, unquestionably, the most severe, the most fatal, the most horrible of these is small-pox. We have a precaution of preventing people taking small-pox during the rest of their lives, and that precaution is vaccination during infancy: that is a precaution which is compulsory by the law of the land, but

whether it were compulsory or not, I should not be doing my duty if I did not say it, one of the mistakes which some people make is not to have their children vaccinated before they are three months old. Now, we pass on from infancy to childhood. In childhood the great danger to life and health is the danger I mentioned under infancy—the danger from external cold. Now, why is this? Children we know have quick circulations; they breathe very fast, they manufacture a great deal of heat; they are, so to speak, very hot-blooded creatures, and they ought not to suffer, you think, from external cold. Why do they suffer from the external cold? Simply because they are small; because the smaller the body is, the larger is its surface in proportion to its bulk or contents. You can make this out for yourselves. If you calculate the difference between the surface of a cube, the edge of which is an inch, and its contents, and the surface of a cube, the edge of which is ten inches, and its contents, you will find that the surface of the small cube is ten times larger in relation to its contents than the surface of the large cube in relation to its contents. You may prove the same thing with a sphere, and what is true of a cube and a sphere is true of a child.

It is from the external surface of our bodies that we lose heat, and the child having a much larger surface in proportion to its bulk than the adult has, loses heat from its large surface faster than it can replace it, so the great danger to young children is from external cold. What are the mistakes made in connection with this you will see at once. When we go out of doors, whether in summer or winter we go out clothed from head to foot. There is not a particle of our body that is not covered except our faces and a small part of our heads, and a part of our necks, and perhaps our hands. But how do we send these little children out? although their great danger is from the external cold they are sent out with bare neck, bare arms, and bare legs. It is a most monstrous thing, and the health of thousands of children and the lives of thousands also are sacrificed to the fact that they are sent out in all weathers, whether summer or winter, but particularly in winter with bare arms and bare legs to walk about. Children ought to be clothed always from head to foot, whether in summer or winter. In the winter they ought to be well clothed, and in the summer lightly clothed, and the parents who send their children out partially unclothed would be much more sensible if they went about in the same way themselves instead.

Now children require I need hardly tell you, plenty of food. Hippocrates said "children do not well support a fast," and though it is a long time since he said it we see no reason to correct it.

Children require to be fed frequently and to have plenty of food. They require plenty of sleep because they have to grow. It is a great mistake to worry children to prevent them having the sleep they want. It is during rest, during sleep, that we adults repair our tissues. During work we waste our tissues, during sleep we repair them. Now a child has not got merely to repair his tissues. His tissues have got to become larger, and so he requires more rest and sleep because this is the time when this work is being done. Then children require plenty of change of employment. They require to be a short time at one thing and then a short time at another. I do not care whether the employment is play or work they ought not to be kept too long at one time at the same thing, because their attention becomes strained and tired until they do not care about anything. Many mistakes are made about this, both about enjoyments and still more as regards work. It is a great mistake in schools to keep children too long together at the same task or too long together at any task.

We come next to the third period of life—youth. Youth, we are told by the pessimist philosopher, is "a folly." Well, now, we do not expect youths to be wise men; they would be great prigs if they were. But still, though a certain amount of folly may be excusable, we do not want too much of it. Now, in youth most of our habits are formed; of course they are formed to a certain extent in the periods gone by; but habits are formed and become part of our individuality in youth, and so it is of the greatest possible importance that the habits that are formed should be good ones.

Well, now I will mention what I suppose are the most important of all habits first, though on this point we may very likely have differences of opinion. One of our most eminent judges, who thought he should like to find out how to live as long as possible, made a practice of putting a series of questions on habits to every aged witness who came before him, and he found that these aged people differed largely in their habits, except in one particular. Some of them drank spirits, and some of them did not; some smoked tobacco, some of them in excess, and others did not; some drank tea for their breakfast and others coffee, and so on in other habits; but there was one point they all agreed about, *they were all early risers.* Now, early rising means another thing: it means early going to bed. I defy anybody to be an early riser by habit if he does not also go to bed early; and that "early to bed, early to rise," which it is said "makes a man healthy, wealthy, and wise," is the best habit shown by the enquiries of that learned judge. I mention the first, and I see from your applause that no words of mine

are needed to recommend it to you. What about other habits that are learned in youth?

Well, the worst of all habits learned in youth is the habit of drinking alcoholic liquors in anything like excess, in anything but in great moderation. That is a habit which once acquired is difficult to break, and it is a habit which is got chiefly in two ways. It is not got by drinking wine or beer at meal-times. It is got in the first place by drinking spirits and water at night. This is what men call having a nightcap. That means that when the stomach is empty or nearly empty you take into it a mixture of alcohol and water, and not merely alcohol and water, but alcohol and water containing a much more powerful substance than alcohol does—namely, the essential oil of the whiskey or other spirits which you take. That is a most diffusible fluid, and when you take it into your stomach empty or nearly empty it has its own action on the stomach first and then passes direct into the blood. First it alters the stomach, so that the stomach of the drinker, when examined by experienced anatomists after death is known perfectly well. It is a different kind of thing to the stomach of a healthy man. It is diseased; again this fluid acts directly upon the liver, and produces in the liver a disease which is perfectly characteristic. The liver of a drunkard is as different from the liver of an ordinary individual as a tumbler is from a tea cup and more different.

That this is the case is perfectly obvious, and you will agree with me, and it is perfectly clear that it is so, when I tell you that the diseased liver so characteristic of the drinker and produced by alcohol is known in various countries by the name of the drink. In England it is called "the gin-drinker's liver," in France the "absinthe drinker's liver," and so on in other countries; so that you see a perfectly well recognised alteration in a most important organ of the body (the largest gland in the body) is produced by drinking spirits, and especially by drinking spirits at night-time.

The other way in which spirit drinking is mischievous is in what is called taking "nips"—that is to say, taking small quantities of raw spirit of any kind at all times in the day, not at meal-times. People do not do it at meal-times when it would not do them so much harm, but they do it halfway between meals, when the stomach is empty or nearly empty. That is the other mischievous way in which spirits are drunk, and the result of that is sometimes a good deal more mischievous—it is always more mischievous than the person who drinks expects, but sometimes the effect is a good deal more sudden than he expects. I have known several instances of persons who have drunk a strong dose of some immature whiskey—I say whiskey

because that is most used, the same result might follow from the use of other kinds of raw spirits—I have known cases where a man after a dose of raw whiskey between meal-times has felt a sudden pain in the pit of his stomach as if he had taken a dose of arsenic or antimony, and has fallen prostrate and died in a few minutes. That is direct poisoning from the alcohol, or whatever is contained in the raw whiskey.

Youths should be taught, if they drink alcoholic liquors at all to drink them in the greatest moderation, and to drink them only at meal times. You know some people sign a pledge that they will not take any alcoholic liquors at all. I will not say a word for or against that plan. There are plenty of people who will not do that. If those persons would take a pledge to themselves—whether they sign anything or not is immaterial—and carry it out, not to drink except at meal times, an enormous deal of good would be done.

A very important habit to acquire is that of eating slowly so as to give time for the efficient mastication of the food; people who expect their stomachs to do the work that ought to be done in their mouths must not be surprised if they suffer from indigestion and from all the consequences of it.

Now with regard to smoking I have very little to say. Whatever good smoking may be, later in life, in middle age and old age, all sanitarians agree that smoking is pernicious to growing youths. I have never heard anyone who has attempted to deny that, so I will pass on, merely saying that smoking is a habit not only quite unnecessary for youths to indulge in, but pernicious to growing youths, and therefore they should be discouraged in every possible way from commencing it.

I must not forget to mention to you that cases of small-pox become more frequent during youth even among persons who have been vaccinated in infancy, the effect of infantile vaccination apparently passing away to a great extent at puberty. It is therefore necessary that youths should be re-vaccinated, an operation which provides a far greater security against small-pox than does a previous attack of the disease itself.

We come next then to manhood. Manhood is, as we all know, the time of marriage. I am told that mistakes are sometimes made at this period of life. I am not referring to the mistakes you are thinking about. The mistakes I refer to are of a very different kind. We know there are certain diseases that are called hereditary diseases—diseases which run in families is another way of saying it. We have all heard of families that are called consumptive families. Unfortunately in this climate of ours, where consumption is one of the most fatal of all diseases, and the most fatal in one

sense, killing more than half as many people as all the zymotic fevers put together, consumptive families are not uncommon. We have heard also of nervous families, and these furnish an unusual number of inmates to our lunatic asylums. When we speak of diseases running in families we mean there are certain diseases the tendency of which is hereditary—diseases which descend from father to son, from grandfather to grandson, from mother to daughter, which in fact somehow or other descend from generation to generation. You may ask what has this to do with marriage? It has this: that hereditary diseases are increased in their virulence, and are spread as it were by the marriage of persons belonging to families in whom the same diseases are hereditary. If a person belonging to a consumptive family marries a person belonging to another consumptive family that person's children will almost to a dead certainty inherit consumption in its worst form. Some of them will die as infants; most of them will probably grow to be eighteen, nineteen, twenty, or twenty-one, and then they will all die as if cut down by a scythe. I have seen it over and over again.

Now, take nervous diseases—the other illustration I have given. If a person belonging to a family in which nervous diseases are prevalent marries a person belonging to another family in which nervous diseases are prevalent, the children of those persons and their grandchildren will suffer from nervous diseases almost to a dead certainty of the worst type, and almost to an equal certainty will furnish inmates to lunatic asylums. I might go on to speak of other hereditary diseases, but those two illustrations are sufficient to show what I mean. It is of the greatest importance, and it is the duty of the sanitarian to insist on it that persons should not marry other persons subject to the same diseases as they are.

Now, at this time of life it is necessary to choose a house or habitation, and I need hardly insist upon it, as I feel that I must get on, that it is necessary a man should take care as far as his means will allow that the house is in a properly sanitary condition, that the drains, if there are any (happy is the man who has a house without drains), are in good order and the rooms well arranged as to ventilation and light. This is a subject too often overlooked. If you want your children to be healthy and strong one of the first things to be done is to give them a house as healthy as possible to live in.

Now, I will pass on at once to middle age. This is what you may call the stationary period of life. Life has been compared to a hill with a gradual slope upwards, a long plateau at the top (which is the latter part of manhood and middle age), and then a steep decline. In middle age the mistake that is generally made is that people do not take enough exercise. They begin to get stout—that is because they take too much food or take too little exercise, or because they make both mistakes. Now, at this period of life it is important that a sufficient amount of exercise should be taken, and it is also important that too much food should not be taken. One well-known hygienist has said that in youth the most harm is done by taking too little food, and that after forty the most harm is done by taking too much. At this time of life the results of habits begin to show themselves, and the diseases that are caused by bad habits begin to become chronic.

If the habit of cleanliness has not been observed during the earlier periods of life, at this time of life the skin will not do its work properly. At this period of life even in the most healthy persons the action of the skin becomes sluggish, and the less the skin acts the more is this action thrown on the internal organs—the lungs and kidneys. At the same time very likely at this period the lungs and kidneys have become weakened, and so if the skin does not act those organs are still more likely to become diseased; therefore, as cleanliness is important in all periods in middle age, it is exceedingly important not only to encourage exercise, but to encourage the action of the skin by tepid or warm baths, so as to prevent the work which the skin ought to do from being thrown on some of the internal organs.

We pass on to old age. Now, in old age we come again to the danger that we mentioned once before. The great danger in old age as in infancy and childhood is from the external cold, though the reason of course is quite different. The reason why the danger in old age is from the external cold is that old people do not produce heat enough. Their respiration is slow; their circulation is slow. The amount of oxidation by which heat is produced that is going on in their blood is little, and so they do not produce heat fast enough, and cannot afford to lose it, so the great danger is from the external cold. They are chilled, and get generally bronchitis or inflammation of the lining membrane of the air passages of the lungs. That is the great agent of death in old age; so that the most important precaution in old age besides carrying out the precautions of previous periods is to avoid external cold, not to be exposed in cold weather, and to wear warm clothing.

And now we reach "the last scene of all," as Shakespeare says,—

> "That ends this strange eventful history,
> In second childishness and mere oblivion;
> Sans teeth, sans eyes, sans taste, sans everything."—

decrepitude. Now, what are the mistakes made in this period

of life? Who are the people that reach this period of life? They are the people who in the first place I may tell you have chosen their parents well. No people reach this period of life who have not had aged parents. Those who reach this period are those for whom the mistakes of infancy and childhood have not been made by their parents, who have been properly trained in youth and have contracted good habits, who have not committed the excesses of youth or of manhood, who have avoided all the mistakes made in middle age, and who have not exposed themselves to the external cold in old age. The people who have not made the mistakes they see others make around them are those who reach the last stage of life so graphically described by Shakepeare. Why do they die? you may ask. That is not so easy to answer. They die for a reason which is not so simple. During the whole period of life a process of hardening of the tissues goes on. I cannot describe it to you in this lecture. From the earliest condition of the human being the hardening process goes on to the advantage of the individual up to his manhood. After that it goes on apparently neither to his advantage nor to his disadvantage, but really slightly to his disadvantage. Then it goes on until he begins to feel the effects of it. The elasticity of the skin disappears, and it becomes wrinkled. The elasticity of the lungs becomes diminished, and they do not expel the air so well. Later on—a thing which I am feeling already—the eyesight is not so good as it was before, the sense of feeling is dulled, the sense of hearing is not so good, and from the hardening of the nerves, and from this continuous hardening of the tissues, there comes an end of life; for this process which goes on to the advantage of life up to a certain point goes on afterwards until either the lungs become so hard that they no longer force the air out, or the arteries become so hard that they prevent the heart forcing blood through them, and the man either ceases to breathe or his heart ceases to beat. That is why we must die. We cannot live for ever.

THE ESSENTIALS TO HEALTH—AIR, WATER, AND SUNSHINE.

LECTURE TO THE WORKING CLASSES,

By Henry Law, M.Inst.C.E., F.R.Met.S.

I propose to devote the few minutes at my disposal this evening to saying a few words on the three essentials to health, namely, air, water, and sunshine.

I need say nothing to convince you that air is not only essential to health, but even to life, as we all know that to be deprived of air for only a few minutes produces death; consequently the whole earth is surrounded with a covering of air, so that wherever human beings may wander there is the air present to sustain life. The air is composed almost entirely of two gases, named *oxygen* and *nitrogen*, in the proportions (by weight) of one of the former to three and a half of the latter; and it supports life by being drawn into the lungs, where it is brought into contact with the blood, which the *oxygen* contained in the air purifies and renders fit for nourishing our bodies; it is then discharged from the lungs, but no longer in a condition fit to be breathed, as it has lost much of its oxygen, and now contains a deadly substance, called *carbonic acid gas*, besides other impurities. Such being the case, you will readily understand how necessary it is to healthy life that the same air should not be taken more than once into the lungs, and therefore that the air which we have breathed should be continuously changed, opportunity being given for its escape, and for its being replaced by fresh air in its pure state.

Now at the present time the population of the earth may be taken at about 1,500 millions, and each person renders about 3,000 cubic feet of air impure per hour; therefore, the whole population of the earth renders impure and unfit for healthy

life, in every day, a quantity of air which would fill a space equal in area to the whole of England, and 77 feet in height. But the breathing of human beings is only one, out of many causes, which renders the air impure and unfit for breathing,—amongst which may be mentioned the breathing of animals, the burning of coal, wood, gas, oil, &c., to produce heat and light, and the decay and putrefaction of vegetable and animal substances. Although, therefore, the atmosphere contains upwards of 1,000 millions of cubic miles of air, or about three-quarters of a cubic mile of air to each person, it is evident that, in order to preserve the air in a state fit to sustain healthy life, means must be provided for restoring it to its original purity.

With that simplicity and perfection which mark all the arrangements of nature, these means are provided, and consist first of a property which all gases possess of diffusing themselves equally throughout space, so that, although carbonic acid gas, which I told you was thrown out of the lungs, is very much heavier than the general air, and would naturally fall to the ground, and there remain, and would in the course of a few years render the air near the surface of the earth unfit for the breathing of human beings; so perfect is the result of the action of this property, which is termed the *diffusion of gases*, that wherever the air is examined, whether in the bottom of the lowest valleys or on the tops of the highest mountains, the quantity of carbonic acid gas is found to be the same.

But it is not sufficient that this deadly gas should be dispersed equally throughout the whole atmosphere, for a very slight increase in its quantity renders the air unfit to breathe, and unless some means existed by which it was removed, it would gradually accumulate until the whole atmosphere became unfit to support life.

And again, we have the means provided for its removal, as universal and as constant in its action as is the cause of its existence; namely, by the property which plants possess, when aided by the presence of light, to decompose the carbonic acid gas, seizing upon the carbon to form its own substance, and setting free the oxygen, to render the air pure again and fit to breathe.

Water, the second essential to health, covers about three-fourths of the whole surface of the globe, and is also composed of two gases, of which *oxygen* is one, and the other is named *hydrogen*, united in the proportion (by weight) of eight of the former to one of the latter. Water, however, either in the solid, liquid, or gaseous state, is found everywhere, for the air contains one-seventieth of its bulk of water as vapour; while

nearly three-fourths of our food consists of water, and it composes a very large proportion of our bodies and of the solid substance of the earth.

Water, in a similar manner to the air, is exposed to a great number of circumstances which render it impure; and were there not also other circumstances constantly at work to purify it, would soon be rendered unfit to sustain life. The two most general processes by which water is, in nature, restored to its original state of purity are those of *distillation* and *oxidation*. *Distillation* consists in the water being converted into vapour by the heat of the sun, forming fogs and clouds, which are free from most of the impurities which existed in the water; and these clouds being condensed in the form of rain or dew, and so being restored to the earth in the form of pure water. The other process by which impure water is rendered pure, is that of *oxidation*, which consists in the oxygen of the air becoming mixed up with the water, by their being more or less violently agitated together by the action of the wind, or the motion of running streams; the result being that the oxygen enters into combination or union with the impurities in the water, and by so doing completely changes their nature, and renders harmless, substances which in their original state were deadly poisons.

There is another agent which prevents both water and air from becoming stagnant and unfit for supporting healthy life, and this brings me to the third essential to health, namely, sunshine.

We all know that the sun is the great natural source of light and heat, and that rays of light are always proceeding from the sun in all directions with a speed so marvellous as to be beyond our realization; for, although the distance of the sun is about 93,000,000 miles, light takes only eight minutes to travel from the sun to the earth, being at the rate of about 195,000 miles per second, or 300,000 times faster than the shot thrown from one of our most powerful guns, and nearly 1,000,000 times quicker than the rate at which sound travels. We occasionally have this fact of the greater velocity of light than that of sound rendered evident to us, by the familiar fact that lightning is always seen before the thunder is heard, although both occur at the same moment.

Now the two properties of sunshine with which we are most familiar are those of light and heat, but there are others of equal importance which are not so evident to our senses. You have, however, all of you seen photographs, and probably are all aware that they are produced by the rays of the sun, which exert what is called *chemical* action on many substances. Again, most of you have heard of *electricity*, the great

agent which is the cause of thunderstorms,—the agent which enables us to send messages by the telegraph from one end of the earth to the other in an incredibly short space of time, or to hold conversations by the telephone between parties situated many miles apart; and this agent of electricity is only sunshine in a different form. Many of you, again, have heard of *magnetism*, which causes pieces of iron which have been subjected to its influence to attract and hold all other pieces of iron, and further, causes the *magnetic* needle, or *compass*, as it is termed, always to point in a northerly direction, by which means the course of vessels is determined at sea, and without which the navigation of vessels would be rendered exceedingly difficult, and only possible with speed and safety when the sky was free from clouds. This agent, which we term *magnetism*, is again only sunshine in another form.

It is, however, only with those properties of sunshine which affect health that I have to do to-night, and these are *heat*, *light*, and *electricity*. The first thing which I have to observe in reference to heat, light, and electricity, is that they are all capable of being converted one into the other, and of producing *motion*.

Now, whenever any body, having weight, is in motion, it can only be stopped by some force or effort opposed to it, which is familiarly expressed by saying that any body in motion will do a certain amount of *work* in being brought to a state of rest; and the *work* thus done is called *vis viva*, or *living force*. A certain amount of this living force exists in the universe, and has so existed, without increase or decrease, from the creation; no force is ever lost, it may change its form and become locked up, or disguised, but it cannot be destroyed. Thus, *living force* in the form of *electricity*, acting from my brain on my nerves and muscles, at the present moment, enables me to move and to speak to you; my voice only reaches you and is heard, because I have thrown the air into motion, and by creating waves of varying lengths produce on your ears the sensation of particular sounds and words; that sensation is only conveyed to your brains by living force in the form of electricity, and the waves which I produce in speaking, gradually impart their living force to matter around.

Now the great storehouse of living force is the *sun*, and the means of conveying that force to the earth is *sunshine*. Ages back this same sunshine produced, upon the earth, heat and light, and caused the growth of enormous forests, the remains of which we now find buried in the earth in the form of coal, and from which we are able to obtain again the living force there stored up for our use.

At the present day, the heat from the sun continually produces motion in the air and water, which form the atmosphere and ocean, and by this continual movement, restore both of them to that state of purity which is essential to healthy life.

Thus, the heat of the sun causes the air upon which its rays more directly fall to expand and become lighter than before, and so rise from the surface of the earth, while the cooler and heavier air rushes in from all sides to fill the space thus left, and this movement of the air is familiarly known to us as wind.

Again, the heat of the sun, as I have already mentioned, converts a portion of the water of the ocean into vapour, which rises into and mixes with the air, remaining there in an invisible state until a change of temperature causes it to become condensed into clouds, and ultimately to fall as rain; and by this process the air is being continually washed and cooled.

Further, the heat of the sun has the same effect on the water of the ocean as it has on the atmosphere, producing constant movement, and thus preventing the water from becoming stagnant and unfit to support animal life.

I have already told you that a certain amount of living force exists in the universe, of which none is ever lost or destroyed, but which reappears in various forms, which we term *light*, *heat*, *electricity*, *magnetism*, *sound*, *and motion*; so also with matter, or the material substances of which the universe is composed. Matter in the universe is constant in quantity, and cannot be lost or destroyed; its form may be changed, it may be converted into a liquid or an invisible gas, but not one particle of it has been lost. We may burn any substance so as to entirely consume it, and leave only a few ashes visible, but nothing has been destroyed; and if the combustion was performed in an enclosed space, so that nothing could escape, we should find every grain of every substance that originally existed in the article burnt still there, although possibly in a form very different from its original state.

Notwithstanding the enormous variety of different substances which exist in the world, there are but comparatively few *elements* of which they are composed; for the most extraordinary changes and differences of property and character are produced by a very small variation in the quantity of one of the elements which compose the substance; and even sometimes the same elements, united in the same proportions, differ in the most remarkable manner, simply because they are arranged in a different manner. Thus, one of the most corrosive substances known, namely nitric acid, or *aqua-fortis*, is composed of exactly the same elementary substances as the air which we breathe, namely, oxygen and nitrogen, the only difference being that

they are united in different proportions, and in a different manner. In fact we can convert the pure, harmless air which we breathe into the corrosive aqua-fortis, by simply sending through it a current of electricity in the form of sparks. As a matter of fact, the great bulk of the materials of which the earth, and all that it contains, is composed, consists of some half dozen elementary substances, of which the constituents of air and water form a very considerable part.

As regards light, or sunshine, it is not only essential to health as the means by which air and water are restored to a state of purity, but it has its own direct influence on our health and comfort. It is the great discoverer of dirt, and as such the good housewife's best friend. Light is necessary in order that the animal spirits may be constantly refreshed and invigorated. Light assists the due nourishing of our bodies by food, and sustains our blood in a healthy state, and gives the rosy colour of health to the cheeks of our children.

Recent researches have fully established the fact that both air and water, when impure, contain germs which are injurious to health, and that it is equally injurious that the air which we breathe should contain an undue quantity of water, mixed with it in a state of vapour. If the walls of our houses are damp, or the house liable to be surrounded with puddles of stagnant water, or if dirt is allowed to accumulate, the air will be rendered moist and impure; and if the water which we use for drinking and cooking purposes is exposed in an open cistern, it will absorb the impurities which exist in the air.

A very large proportion of the diseases from which we suffer are the result either of our breathing impure air, drinking impure water, or having an absence of light in our dwellings. In fact, there are a class of diseases which have been aptly named *filth* diseases, such as cholera and typhus fever, which, if there were no such things as impure water and air, and if our dwellings were light and well ventilated, would become unknown. And yet we have it on one of the highest authorities, namely, the late Dr. Farr, that not less than one-seventh of the population die from filth diseases.

Allow me then, in conclusion, to give you a few practical hints for securing as large a share as possible of the benefits resulting from the possession of the three essentials of health of which I have spoken.

To obtain the first essential of pure air, the house, furniture, and clothes should be kept as clean and free from dirt as possible: the walls are far better distempered instead of being papered. The floors should be stained and varnished or painted, the carpets being loose, so as to be frequently taken up and beaten; the heavy pieces of furniture should be on castors, so as to be easily moved. In the kitchen the brightness and cleanliness of the cooking utensils should be the careful housewife's pride. In the bed rooms the furniture should be scanty and simple—iron bedsteads and no curtains or valences; floors should be frequently scrubbed, and only strips of carpet by the bed-side. Every living and bed room should have an open fireplace and opening windows. The beds should always be thrown open for some hours after being slept in: it is a great mistake to make the bed immediately after having been used; this is a case in which tidiness must give place to health.

I have explained to you how the act of breathing renders the air unfit for healthy life, you will, therefore, at once see how detrimental to health it must be to crowd too many persons into one room, and this is specially so in the case of bed rooms, for during sleep the nervous power is low, and the person is far more susceptible to receive harm from the impure state of the atmosphere. I know that the desire for warmth is one of the chief reasons why the grate is frequently closed by a board, and every crevice for the admission of fresh air, either at the door or window, is carefully closed with sand bags and list. I recollect how the Irish peasant, on being remonstrated with for the crowded state of his cabin, said:—"that it was so cold without the pig." But if you will only try the experiment of admitting plenty of fresh air into your bed rooms, you will find your sleep far more refreshing.

It is equally important to attend to the surrounding of your dwelling outside, the ground should slope away from the walls, and should, if possible, be paved, or at least firm and hard, so as not to remain in a damp state; and if you have any spare ground it should be cultivated as a garden.

If the water is supplied to you in a cistern, you should have it frequently cleaned out, and always kept covered with a properly fitting lid.

Now I have had a great deal to do with working men in my life (in fact I claim to be one myself), and I have always found them very open to conviction and amenable to reason, and therefore having thus briefly shown you the importance to your health and comfort of pure air, pure water, and plenty of sunshine, I feel confident that you will do your best to secure these blessings without further urging on my part.

SELF-PRESERVATION AND EPIDEMIC DISEASES.

ADDRESS TO THE WORKING CLASSES.

By J. F. J. Sykes, B.Sc. (Public Health), M.B.

Self-preservation stands out as the great guiding instinct of all living organisms, the preservation of life and health being fundamentally necessary to secure food for nutrition, and to reproduce the kind for perpetuation of the species. Yet, strange to say, man, whilst striving to protect his life against enemies, to increase his food supplies and other necessities, to reproduce and develope his kind, has, until quite recent years, been less successful in the preservation of his health and life against disease, with the result that he has been decimated by plague and pestilence in the past, and by epidemics in more recent times. It may be interesting to inquire why this most powerful instinct has been followed at so great a distance by man in defence against disease, especially that of an epidemic character.

In order to obtain a clear idea of the matter, we must understand something of the incidence of disease—the enemy, and of the social condition of man—the victim.

Disease may be inherited or acquired. The amount of actually-inherited disease is very small, compared to the total amount of disease prevailing; but the amount of inherited predisposition to disease is large, inasmuch as our constitutions are inherited from our parents, and constitution is the important factor in predisposition to disease. Disease may often be apparently inherited, when in reality it is but the constitution predisposing to the acquisition of disease that is inherited. It is important, therefore, for parents to cultivate and maintain sound constitutions to hand down, as a precious inheritance, to

their offspring. The ill results of in-breeding by inter-marriage of blood-relations, has been observed from time immemorial; but the disastrous results of the inter-marriage of persons inheriting like predispositions to disease are not even now sufficiently realised and avoided. Heine said truly that a man should be careful in the selection of his father and mother.

Acquired disease may be due either to physical or chemical agents not possessing life, or to living agents capable of reproducing themselves indefinitely. To the former class belong the functional and organic diseases, and to the latter the parasitic and zymotic diseases. That climate, situation, soil, diet, and habit largely influenced disease of organs of the body and of their functions has been known from time immemorial, and that the large visible parasites were also known as the cause of disease from time immemorial is shown by the fact that man became a cooking animal, and the first object of cooking is sterilisation, or the destruction of living organisms in the food. But that small, invisible, or micro-parasites, should be the cause of what are now called zymotic diseases, is a fact that has only been realised within the last half century, and until the fourteenth century it was not even realised that it was possible for epidemic or infectious diseases, which are now known to be due to these invisible parasites, to be communicated from person to person, directly or indirectly, but were invariably attributed to the direct visitation of God, and no means whatever taken to prevent their spread, until in 1399 Count Bernardo in Italy instituted quarantine.

Invisibility of the causes and consequent ignorance of the methods of attack of infectious diseases will thus be seen to have been one of the reasons for defective defence against them. Prolonged observations unmasked the methods of attack, and quarantine was established in defence. But since that day multitudinous researches have laid bare the causes of these diseases, and now the nations are learning by bitter experience that that method of defence was faulty; that infectious diseases cannot be kept at bay by big battalions, however heavily their guns may be loaded or whatever the length of their bayonets; that they can only be checked by continuous and persevering control in detail, and not by spasmodical and hurried envelopment by masses of troops, or absolute exclusion of mercantile fleets. Soldiery and police are giving way to sanitary officers.

But this invisibility of the cause and of the methods of attack must still be largely reckoned with. It accounts for much of the callousness displayed towards infectious diseases, and stimulus to self-preservation can only be imparted by

educating the knowledge of the people to a sense of the danger that lurks unseen and unknown in every person, object, and dwelling infected. This reckless callousness is sometimes displayed by mothers and nurses, with infants on arm and children by their side, paying visits of sympathy to the bedside of those suffering from infectious disease or of condolence to the death-chamber; at other times, from compassion upon the cooped-up invalid, by the laxity with which child or adult is released to mix with playmates or companions whilst but convalescent from infectious disease; at other times, by the kindly gift, a needy sale of some infected article of dress or furniture; and in many another simple and unheeded manner.

The facts are but partially known, and where known little regarded, that infection imperceptibly taints the clothing and food, the water and the air, and through these travels from person to person; that infectious disease prostrates with sickness, and, when it does not kill, frequently maims the internal organs, permanently handicapping children and adults in the battle of life.

Fatalism is another cause that has paralysed action against infectious disease. Man arrogates to himself the moulding of events, the cause and effect of which he has knowledge oblivious then of his Maker, but events, of the cause and effect of which he is ignorant, and of which he dreads to place on record that his duty is not yet accomplished in learning to read and to obey the natural laws of the Almighty, he hands over the responsibility to his Maker in the words "visitation of God," and it is recorded as "ignorance of man." This fatalism explains the helplessness that populations in former days yielded to in the face of epidemics for fear of offending the Almighty.

Something of this spirit still remains, and the idea that what are sometimes called children's complaints, which mainly consist of infectious diseases, are bound to be experienced at some period of life by every individual is not yet rooted out. Nor is the idea that it is better to have a disease whilst young rather than later in life. These are both exploded fallacies, and the wider the knowledge is spread that there is no necessity to undergo such diseases at all, the better for the present and for future generations.

M. Pasteur, the eminent French chemist and biologist, in the Croonian lecture delivered before the Royal Society in the spring of this year, stated that the virus or germ-poison causing certain infectious diseases, can be so attenuated or weakened by cultivation after cultivation as to be rendered perfectly innocuous, and he further stated that by reversing the process and passing an innocuous germ-poison successively through the bodies of

animals, commencing with one just born up to the adult animal, that this living poison can be so fortified as to become extremely virulent and rapidly fatal. The words of Pope almost fit the process:—

> "As man, perhaps the moment of his breath,
> Receives the lurking principle of death,
> The young disease, that must subdue at length,
> Grows with his growth and strengthens with his strength."

This leads us to presume and experience points in the same direction that infectious diseases, commencing in a mild form and affecting infants in the first place, may ultimately, under neglect, become very virulent, increase in infectiveness and destroy the adult population; and, *vice versâ*, that by protecting the adult population from attack by suppressing it in the children, it may be so reduced in virulence as to run but a mild course in those that are attacked. It is surmised that scarlet fever is being so affected in some localities where infectious disease is being efficiently restrained.

The lesson this teaches is to nip the disease in the bud, to curtail it in infancy, and to prevent by all means its extension, and so, to preserve not only the infant, but also the adult population from decimation by epidemics, and it must be remembered in this connection that infancy is the age most prone to infectious disease.

The idea that it is better to have these diseases when young has also been dissipated by the statistics published in a recent Annual Report of the Registrar-General, wherein it is shown that scarlet fever is most frequent and most fatal amongst the very youngest children, and that this frequency of attack and also the fatality of those attacked, gradually diminishes up to middle life, so that the longer the disease can be staved off, the less chance there is of being attacked, and, if attacked, the less chance there is of dying from the disease. Such facts destroy the fatalistic idea root and branch, and encourage you to treat no longer the infants' infectious complaints with scorn and neglect, harbouring and strengthening an insidious enemy into life in the warmth of your hearth.

Individualism, under the plea of which the individual claims perfect freedom of action, is another cause that has hitherto stood in the way of preventing the spread of infectious disease. Although it has been a boast that "an Englishman's house is his castle," it has not prevented the King or the State from invading that castle whenever it contained criminals, nor from searching it when it contained explosives, and now the State recognises that contagious poisons are equally as dangerous to

the community as explosives or criminals. That public opinion, which maintains for defensive purposes a navy and an army against external enemies, and a police against internal enemies, now recognises the necessity for defence against the most domestic enemies. For self-multiplying, living parasites are as truly enemies as any foreign foe, and fight with as fatal results. More armies have been destroyed by the parasites of epidemic disease than have ever been destroyed by man.

The *instinct* of self-preservation from a neighbour's disease, with the growth of knowledge of the means, is proving itself stronger than the *sentiment* of "castledom." The conditions of modern life impel us in this direction; formerly dwellings stood isolated from one another, gradually they have approached each other, until they now not only share the same party walls, but rest upon one another in "floors," with staircases and air supply in common. We now not only dwell side by side, but also layer upon layer, like sardines in boxes, bathed in a common fluid. We dwell under exceptional conditions, brought about by the combined action of the members of communities crowded together in cities, and the combined action of the community is also requisite to maintain the health of its members. The closer and closer we live together, the more and more mutual our interests become, and the more subservient our acts must become to the benefit of the community rather than to the caprice of each one's particular fancy.

"Love thy neighbour as thyself," especially in matters of health. The health of your neighbours is the barometer of your own, and your freedom must not be restricted through sickness by the too great freedom of your neighbour. Resentment of interference, coupled with indifference to others, still strongly prevails in sanitary questions. A London daily paper recently expressed this doubtful form of independence in these terms, to the tune of the Roast Beef of Old England:

> When good Queen Victoria came to the throne,
> Very little of "germs" and "baccili" was known,
> And a cesspool lay lurking beneath every stone.
> Oh! the old smells of old London!
> And oh! the old London old smells!"

Times are changed!

> "We rejoice in a hundred most eminent firms,
> Who will "drain" us and "trap" us on moderate terms,
> *And secure each man's right to his own household "germs."*
> Oh! the new smells of new London!
> But oh! the new London new smells!"

And secure each man's right to his own household germs.

As an illustration of securing this right, this is what was told me at a village where I was recently staying. The village is of considerable size and lies in an open valley, half surrounded by hills, on which stand, in their own grounds, a great number of mansions, and houses of well-to-do men from a large town a short distance away. The village has no water supply of its own, but a small supply has been laid from the adjacent large town, which unfortunately cannot be utilised on account of the absence of sewers, or of other means for the proper riddance of any overflow of waste water. So this village exists by shallow wells and absorbent cesspools. The villagers desired a sewerage system to relieve this serious condition, but the well-to-do surrounding residents who lived upon higher levels, and who had provided themselves with good water supply and drainage, each independently in his own grounds, assembled with their friends and outvoted the villagers. They preferred the chance of an epidemic amongst the villagers to an increase of rates. An Italian proverb says—"Money is dearer than life to the rich man." But if an epidemic break out in that village, it cannot fail to be carried with the supply of necessities into the houses of these same well-conditioned folks to which their highly nurtured and expensively trained offspring will fall ready victims. There is now a further movement amongst the inhabitants of this growing village to establish a local board of health of their own, for they are ruled from a town that lies some nine miles distant, and they will endeavour to possess, under their own control, a water supply and a drainage system, an infectious hospital, and proper sanitary supervision. Let us wish them success.

As this spirit of individualism has found its most able advocate in Herbert Spencer, the philosopher, I will quote a passage from his Social Statics:—"That it comes within the proper sphere of government to repress nuisances is evident. *He who contaminates the atmosphere breathed by his neighbours, is infringing his neighbour's rights.* Men having equal claims to the free use of the elements, having faculties which need this free use of the elements for their due exercise, and having that exercise more or less limited by whatever makes the elements more or less unuseable, are obviously trespassed against by any one who unnecessarily vitiates the elements and renders them detrimental to health or disagreeable to the senses; and in the discharge of its functions as protector, a government is obviously called upon to afford redress to those so trespassed against. Beyond this, however, it cannot lawfully go. As already shown in several kindred cases, for a government to take from a citizen more property than is needful for the

efficient defence of that citizen's rights is to infringe his rights; is, consequently, to do the opposite of what it, the government, is commissioned to do for him; or, in other words, is to do wrong. And hence all taxation for sanitary superintendence coming, as it does, within the category, must be condemned."

An astounding conclusion, the reasons that lead to it being that sanitary supervision is not conducive (1) to economy, nor (2) to the survival of the fittest.

As to economy, let alone humanity, hear what Carlyle says:—"One of Dr. Alison's Scotch facts struck us. A poor Irish widow, her husband having died in one of the lanes of Edinburgh, went forth with her three children, bare of all resource, to solicit help from the charitable establishments of that city. At this charitable establishment and then at that she was refused; referred from one to another, helped by none; till she had exhausted them all; till her strength and heart failed her: she sank down in typhus fever; died, and infected her lane with fever, so that 'seventeen other persons' died of fever there in consequence. The humane physician asks thereupon, as with a heart too full for speaking: Would it not have been *economy* to help this poor widow? She took typhus fever and killed seventeen of you! Very curious. The forlorn Irish widow applies to her fellow-creatures, as if saying: 'Behold I am sinking, bare of help; ye must help me! I am your sister, bone of your bone; one God made us; ye must help me!' They answer: 'No, impossible; thou art no sister of ours!' But she proves her sisterhood; her typhus fever kills *them:* they actually were her brothers, though denying it!"

As to the survival of the fittest, we may ask: Who are the fittest that ought to survive? Who knows? So far as the direct struggle for existence between man and his parasites goes, we may safely say that the parasites are not the fitter as eligible citizens. If on the other hand it be pleaded that the effects of these same parasites is to prove the superiority of a people that can survive their attacks to some others that cannot, then the same will hold good of wolves. We have done wrong in exterminating wolves in this country if they are a test of our powers of survival. We have done wrong in not adopting the Spartan method of testing the strength of our infants, by floating them alone in their helplessness upon the cold waters of the stream, and in many other ways must we have done wrong. But infectious diseases do not necessarily attack only the weakly, they attack the strong also, and maim them when they do not kill. They attack in preference the young, truly, but the child is the future man, and young is not synonymous with weak; Children are helpless but not necessarily weak.

But if all "sanitary superintendence" were abolished, what would be the result? We have the experience of former generations in neglecting sanitation and control over infectious diseases, but the remote past shows the strongest contrast.

Professor Corfield's words are to the point when he said, in speaking on the present state of the sewage question, "I was very much struck by a remark that Dr. Acland made to me the other day upon this subject. He said: 'What do you think was the cause of the depopulation of so many of the cities of antiquity? I think it was pestilence rather than war!' And I think there can be little question when you read the accounts. Why, the black death not only decimated towns, but almost entirely depopulated whole places; so that large and populous cities were left little straggling villages. I think you will be disposed to agree that it is not unlikely that many of the great cities were entirely depopulated in this way, and were lost, so that in some cases even their site is not known."

Another aspect of this narrow view of economy is afforded by the trader who resents interference and considers his own particular profits of such paramount importance that he does not hesitate in distributing to his fellow citizens the milk that has received infection from his household. Carlyle in his incisive manner thus handles a parallel case:—"'What is to become of our cotton-trade?' cried certain spinners when the Factory Bill was proposed; 'what is to become of our invaluable cotton-trade?' The humanity of England answered steadfastly: 'Deliver me those rickety perishing souls of infants, and let your cotton-trade take its chance. God Himself commands the one thing; not God especially the other thing. We cannot have prosperous cotton-trades at the expense of keeping the Devil a partner in them?'"

Turning from philosophy to the preservation of health. Pure food you can obtain by careful selection and by cooking. Pure water too you can obtain by careful selection, and where this has been neglected, cooking also is still a wise precaution. But pure air you cannot obtain by any amount of cooking or selection. You must depend upon your scavenging and sewering without, and your drainage and ventilation within, by isolation and disinfection in infectious diseases; a refuge for your poor in infectious sickness, and the protection of the healthy from attack; and a diffusion through your midst of a knowledge of the course and effects of infectious diseases. Much can be done for children in the course of education by instruction in the plain facts of living and the laws of health, and for adults by the guidance that can be afforded, to their less

favoured brothers and sisters, by the wealthy and leisured associated together to spread the knowledge of sanitation.

The moral of self-preservation has at first blush the ringing sound of a supremely selfish act; but when the enemy comes in the form of disease that cannot be fought in a spirit of individualism, but must be repulsed with a spirit of socialism—in the truest sense of the word—and with a love for your neighbour as great as for yourself, when you appreciate that in preserving the child you preserve the man, that in preserving your neighbour you preserve yourself and your kindred, then does self-preservation call forth the kindest motives and the most unselfish acts; then is the sanitary worker, whether voluntary or official, no longer looked upon as an intruder, but welcomed as an advisor and protector; and when neglect of those precautions that should have been taken result in the death of a neighbour, let it not be recorded against you in the Judgment Book that you asked, "Am I my brother's keeper?" You are!

EXHIBITIONS HELD IN CONNECTION WITH THE CONGRESSES OF THE INSTITUTE.

	1877. Leamington.	1878. Stafford.	1879. Croydon.	1880. Exeter.	1882. Newcastle.	1883. Glasgow.	1884. Dublin.	1885. Leicester.	1886. York.	1887. Bolton.	1888. Worcester.
Number of Exhibitors	117	116	189	106	110	126	134	135	130	112	108
Number of Exhibits	294	319	710	500	600	750	900	1,000	900	800	800
Space occupied (in square ft.)	.....	.....	.....	9,725	14,520	20,000	40,000	30,000	30,000	25,000	28,000
Number of days Exhibition was open	14	16	17	19	25	25	19	17	26	29	23
Total number of Visitors	.....	.....	.....	8,955	8,373	20,000	35,000	37,000	30,000	27,000	23,000
Number of Medals awarded	13	13	12	12	15	21	18	34	16	14	22 *
Number of Special Certificates	None.	6	9	7	4	13	11	11	12	9	None.
Number of Certificates	None.	22	38	40	72	58	83	79	64	40	55 *
Number of Exhibits deferred for further trial	.....	7	52	30	37	44	39	119	42	46	67

* These do not include any awards which may be given for Deferred for further practical trial Exhibits.

LIST OF THE AWARDS AT THE WORCESTER EXHIBITION.

The letter **M**, followed by the date in heavy type, signifies a Medal.
The letter C, followed by the date in ordinary type, signifies a Certificate.

MEDALS.

Improvements in Pharmaceutical Preparations. *Burroughs Wellcome & Co.* **M, 1889.**
Carbolic Acid Preparations. *F. C. Calvert & Co.* **M, 1889.**
Carbolic Soaps. *F. C. Calvert & Co.* **M, 1889.**
Cellular Clothing. *Cellular Clothing Company.* **M, 1889.**
Street Sweeping Machine. *Clemens, Abell & Co.* **M, 1889.**
"Cecil" Slop Sink. *Joseph Cliff & Sons.* **M, 1889.**
Nursery Bath. *J. Cliff & Son.* **M, 1889.**
"Roman" Bath. *J. Cliff & Son.* **M, 1889.**
Toilet Soap. *E. Cook & Co.* **M, 1889.**
Nicholl's "Eclipse" Soot and Salt Closet. *Henry Dean.* **M, 1889.**
Excellence in Manufacture of Water Fittings. *Guest & Chrimes.* **M, 1889.**
Caink's Automatic Pressure Changing Station Gas Governor. *Guest & Chrimes.* **M, 1889.**
Defries Safety Lamp. *Geoffrey Harrison.* **M, 1889.**
Surgical Dressings. *The Liverpool Lint Company.* **M, 1889.**
Washington Lyon's Steam Disinfector. *Manlove, Alliott & Co., Limited.* **M, 1889.**
Fryer's Destructor with Jones's Cremator. *Manlove, Alliott & Co., Limited.* **M, 1889.**
Allliott & Paton's Filter Press, with Pneumatic Attachment. *Manlove, Alliott & Co.* **M, 1889.**
Preserved Fruits. *Vale of Evesham Fruit Preserving Company.* **M, 1889.**
Grahtryx Fan-Light Opener. *J. Ward & Sons.* **M, 1889.**
Ruffard's Porcelain Bath. *J. Ward & Son.* **M, 1889.**
Ruffard's Porcelain Bath. *R. W. Tomlinson.* **M, 1889.**
Exhibit of Flooring and Wall Tiles. *Webb's Worcester Tileries Company.* **M, 1889.**
Exhibit of Art Porcelain. *The Worcester Royal Porcelain Company, Limited.* **M, 1889.**

CERTIFICATES.

Improved Tumbler Cart. *Clemens, Abell & Co.* C, 1889.
Watling's Tip Wagon for Scavengers. *Clemens, Abell & Co.* C, 1889.
Improved Street Watering Van, with Double Distributors and Valves. *Clemens, Abell & Co.* C, 1889.

Improved Air-tight Manhole Cover. *A. T. Angell.* C, 1889.
Air-tight Soil Pail. *William Bennett & Co.* C, 1889.
Thomasson's Inlet Ventilator. *William Bennett & Co.* C, 1889.
"Bland" Copying Machine. *W. Bland & Co.* C, 1889.
Anatomical Boots. *Nathaniel Bletchley.* C, 1889.
"Vinolia" Soap. *Blondeau & Cie.* C, 1889.
Lano Creolin. *Burroughs, Wellcome & Co.* C, 1889.
Cocoa. *Cadbury Bros.* C, 1889.
Enamelled Fire-clay Hospital Sink. *Joseph Cliff & Sons.* C, 1889.
"Beancliffe" Disconnecting Trap. *Joseph Cliff & Sons.* C, 1889.
"Beancliffe" Urinal Base. *Joseph Cliff & Sons.* C, 1889.
Yorkshire Salt Glazed Sink. *Joseph Cliff & Sons.* C, 1889.
Dean's Silt Gully. *Henry Dean.* C, 1889.
Hygienic Dust Bin. *Henry Dean.* C, 1889.
Durran's Metallic Jointed Air-tight Cover for House Drainage. C, 1889.
Removable Rain-water Pipes, Heads, Clips, and Hangers. *James Gregson.* C, 1889.
Self-acting Air-valves. *Guest and Chrimes.* C, 1889.
Defries Petroleum Cooking-stove. *Geoffrey Harrison.* C, 1889.
Enamelled Iron Plates for Decorative Purposes. *Hermann Heim.* C, 1889.
Solid Wood-block Floor-paving. *Holloway Bros.* C, 1889.
Jeyes' "Perfect" Purifier. *Jeyes' Sanitary Compounds Co.* C, 1889.
Edwards' Desiccated Soup. *Frederick King & Co.* C, 1889.
"Sunlight" Soap. *Lever Bros.* C, 1889.
Prepared China Grass for Surgical Purposes. *The Liverpool Lint Company.* C, 1889.
"Florador Food." *McLean & Sons.* C, 1889.
Arrangement for Releasing Horses from Vehicles in cases of Accident. *McNaught & Co.* C, 1889.
Wire Wove Roofing. *New Wire Wove Roofing Co.* C, 1889.
Millar's Reversible Window. *Millar's Patent Reversible Window Company.* C, 1889.
Chemical Heat Retainers. *Peters, Bartsch & Co.* C, 1889.
Robinson's Cement for Plastering. *Joseph Robinson & Co., Limited.* C, 1889.
Trew's Manhole Cover. *The Sanitary and Œconomic Association.* C, 1889.
"St. Bede" Disinfectant. *St. Bede Chemical Company.* C, 1889.
Model Working Dairy. *Miss F. Macleod Spooner.* C, 1889.
Dr. Bond's Regulating Filter. *Sanitary and Œconomic Association.* C, 1889.
Black's Signalling Speaking Tube. *R. W. Tomlinson.* C, 1889.
"Burton" Water Closet. *R. W. Tomlinson.* C, 1889.
"Household" Water Closet. *R. W. Tomlinson.* C, 1889.
"Tornado" Water Waste Preventer. *R. W. Tomlinson.* C, 1889.
Removable Valves for Hot and Cold Water Cocks. *H. Trott.* C, 1889.

Indiarubber Pad for Carriage Steps. *Henry Wall.* C, 1889.
Sanitary Hat Linings. *D. W. Wall.* C, 1889.
"Herald" Kitchen Range. *J. Ward & Sons.* C, 1889.
"Marlborough" Grate. *J. Ward & Sons.* C, 1889.
Shanks' Reliable Water Waste Preventer. *J. Ward & Sons.* C, 1889.
Shanks' "Tubal" Wash-out Closet. *J. Ward & Sons.* C, 1889.
"Imperial" Lavatory. *J. Ward & Sons.* C, 1889.
Cheavin's Water Filter, with Removable Plate. *J. Ward & Sons.* C, 1889.
Air-tight Manhole Cover. *Winser & Co.* C, 1889.
Enamelled Drain Channels. *Winser & Co.* C, 1889.
Stokes' Gully Trap. *Winser & Co.* C, 1889.
"Winser" After-flush Cistern. *Winser & Co.* C, 1889.
Badger's Kitchener. *Worcester Sanitary and Ventilating Company.* C, 1889.
Lloyd's "Winchester" Grate. *Worcester Sanitary and Ventilating Company.* C, 1889.

(Signed)

ROGERS FIELD, B.A., M.Inst.C.E., Chairman.
WYNTER BLYTH, M.R.C.S., L.S.A.
W. H. CORFIELD, M.A., M.D.
BALDWIN LATHAM, M.Inst.C.E.
HENRY LAW, M.Inst.C.E.
LOUIS PARKES, M.D., D.P.H.
J. WALLACE PEGGS, Assoc.M.Inst.C.E.
J. C. STEELE, M.D.
ERNEST TURNER, F.R.I.B.A.

Judges of the Exhibition.

NOTE.—Some Exhibits selected for further practical trial have not yet been decided upon by the Judges.

DONATIONS TO THE LIBRARY DURING 1889.

In addition to the works enumerated in the following list, valuable donations of back numbers of Reports and other official publications have been received from Sir Edwin Chadwick (14 volumes), Prof. W. H. Corfield (33 volumes), Dr. W. Squire (7 volumes), and Dr. Thorne Thorne (214 volumes).

*** *For publications of Societies and Institutions, &c., see under "Academies."*

Aberdeen. Reports by the Medical Officer of Health and Sanitary Inspector, 1889. *Dr. M. Hay.*

ACADEMIES, ASSOCIATIONS, COLLEGES, SOCIETIES, &c.

AMERICAN.

Manitoba, *Historical and Scientific Society.* Transactions, Nos. 30-34. *The Society.*
Philadelphia, *College of Physicians.* Transactions, Vol. XVII. *The College.*
Toronto. *The Canadian Institute.* Proceedings No. 151. Annual Report, 1887-8. *The Institute.*
United States. *National Association of Builders.* Second Annual Convention, held at Cincinnati, Feb., 1888. *The Association.*

AUSTRALIAN.

Melbourne. *Australian Health Society.* Six Wall Sheets, Sketches, Sanitary Houses and Sanitary Faults in Houses. *The Society.*
——— *Australian Health Society.* Thirteenth Annual Report. *The Society.*
——— *Working Men's College.* Report for 1888. *The College.*

BRITISH.

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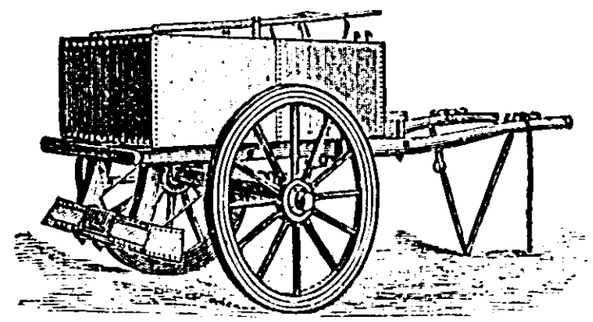

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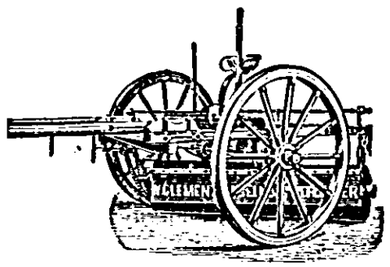

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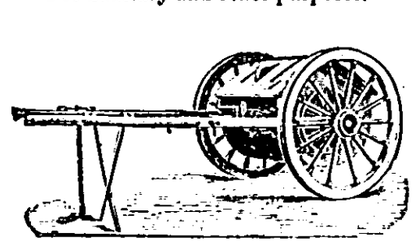

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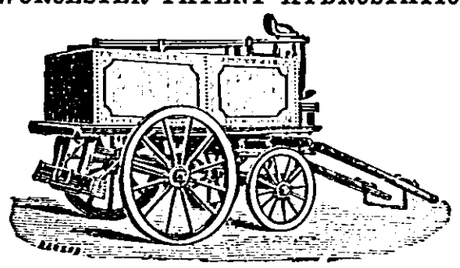

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It is an inexpensive and most generally useful material, being composed of Carbolised Tow and Absorbent Cotton Wool made in thick soft layers.

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A cheap material for use where Fomentations are required.

It is a thick absorbent Felt with patented back, specially prepared to withstand Turpentine and Chloroform.

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Is particularly useful as a Water Dressing, and for the application of Ointments, &c., or may be used as a final covering in place of Gutta Percha Tissue, &c.

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London, 1862.] Established 1795. [Paris, 1867.

PARIS, 1878—THREE MEDALS & HONOURABLE MENTION.

INTERNATIONAL HEALTH EXHIBITION, LONDON, 1884—ONE GOLD, THREE SILVER, AND TWO BRONZE MEDALS.

HEALTH EXHIBITION, WORCESTER, 1889—THREE MEDALS AND FOUR CERTIFICATES

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WINSER'S CHANNEL BENDS AND TRAPS FOR MANHOLES.

THE

"St. Bede Disinfectant."

(PATENTED. REGISTERED.)

A REAL DISINFECTANT!

Used by Medical Officers of Health.

TESTIMONIALS.

REPORT BY DR. EDWARD SEATON ON THE "ST. BEDE DISINFECTANT."
31st July, 1889.

Since it became established that the Per-Chloride of Mercury in the presence of a free acid, or its equivalent, was by far the most efficacious disinfectant, medical practitioners generally, and especially those who have to do with the prevention of fevers, have felt the great want of a convenient preparation which would contain the Per-Chloride of Mercury in the necessary strength together with a free acid, or its equivalent; and which would at the same time be in such a form as could be safely entrusted to Fever Nurses, Sanitary Inspectors and others by whom the processes of disinfection are usually carried out.

Such an article has now been prepared by the St. Bede Chemical Company. It is in the form of blocks, each weighing an ounce, and each containing 17·5 grains, or 4 per cent. of Per-Chloride of Mercury. The block is composed mainly of anhydrous sodium sulphate (392·4 grains), with which is combined 21·5 grains of sulphuric acid; the acid sulphate thus formed appearing to act like a free acid, and to give to the Per-Chloride of Mercury its full disinfecting or germ-destroying power. The block contains also 2·2 grains of eucalyptus and thymol and ·9 grains of indigo, so that when dissolved it has a strong, but pleasant, smell and a bright blue colour. I have had several of these blocks submitted to me for analysis, experiment, and report. I find the proportion of the Per-Chloride of Mercury in each to be as stated, viz., 4 per cent., or 17 grains in the ounce block. The block is rather slowly soluble in a quart of water. The resulting blue solution is described as a very strong disinfectant. In order to test this I have made experiments in conjunction with Dr. Klein, to ascertain the effect of the solution on certain well known organisms which have been proved to be pathogenic or constantly present in zymotic diseases. The tests were made with the bacilli and spores of anthrax, also with the organisms present in cases of cholera and enteric fever. On adding three drops of the culture fluids of these organisms to three cubic centimetres of the blue solution, consisting of one block dissolved in a quart of water, the organisms were destroyed after only five minutes' exposure. This is a very severe test and shows that the blue solution is a very strong disinfectant for infected linen, blankets, &c. We further tested its power of disinfecting the evacuations of enteric fever and cholera. Sterilised fæcal matter in a fluid condition was inoculated with as much as one-seventh part of the culture fluid of the organisms present in enteric fever. To this mixture was added an equal quantity of the blue solution, and five minutes was found to be sufficient to destroy the organisms. I have also tested its antiseptic powers by dissolving blocks in putrescible fluids, and I found that one block dissolved in twenty-five quarts of a putrescible fluid, retarded decomposition five days; and that when dissolved in twelve and a half quarts, there was no sign of decomposition in the putrescible fluid after eight days. I further tested its power as a deodorant by noticing its effect upon heaps of fish refuse mixed with other decomposing animal and vegetable matters, and I found the solution was an excellent deodorant.

The preparation called the "St. Bede Disinfectant" has most powerful disinfecting and antiseptic properties, and is also a valuable deodorant. At the same time its colour and smell are quite sufficient safeguards against the possibility of its mistaken use. I have therefore no hesitation in strongly recommending it on public grounds.

(Signed) EDWARD SEATON, M.D., F.R.C.P.,
Fellow of the Institute of Chemistry.
Medical Officer of Health for Chelsea.
Lecturer on Sanitary Science and Public Health, St. Thomas' Hospital, London.

THE DETAILS OF THE EXPERIMENTS REFERRED TO IN DR. SEATON'S REPORT ARE AS FOLLOWS:—

The "St. Bede Disinfectant" was now in solution, one block being dissolved in one quart of water.

1.—The "killing power," i.e., the power to kill microbes, was tested on the following microbes: (A) bacillus anthracis without spores, (B) spores of bacillus anthracis, (C) the comma-bacillus found in Asiatic cholera, (D) the bacillus found in human typhoid fever.

Of normal cultivations in broth of these several microbes, about three drops were added to about three cubic centimetres of the disinfectant solution, well mixed, and after the lapse of five minutes, one to two drops of the mixture were added to tubes containing about 10 c.c. normal sterile beef broth; for control similar normal sterile beef broth was inoculated with a mere trace of the same culture fluids used for the above experiments. All broth tubes were placed in the incubator at 37° C., while all the control tubes showed already after twenty-four hours' copious typical growth of the several microbes, the others were perfectly clear and remained so afterwards. It follows from these experiments that five minutes' exposure of bacillus anthracis, of spores of bacillus anthracis, of the choleraic bacilli, and of the typhoid fever bacilli to the "St. Bede Disinfectant" solution is sufficient to kill these microbes.

2.—An important and extremely severe test of the killing power of the "St. Bede Disinfectant" solution was made in the following experiments:—

To normal human fæcal matter in thick solution, previously sterilised and contained in test tubes, was added a certain quantity of normal culture fluid of the choleraic bacilli and of the typhoid fever bacilli respectively, about one-seventh of the culture fluid being added to six-sevenths of the fæcal solution. After mixing well the disinfectant was added to each of the fæcal mixtures in equal proportions, so that each of the test tubes contained ½ of the fæcal matter plus culture fluid, and ½ of the disinfectant. After five minutes a number of test tubes containing sterile beef broth, as in the former series, were inoculated with a drop or two from these fæcal mixture tubes, then placed in the incubator and kept at 37° C., but no growth appeared in them and the fluids remained sterile. At the same time that the above experiments were made, control broth tubes were inoculated with a trace of the fæcal solution after the addition to them of the culture fluids, but before the addition of the disinfectant, these control tubes were also placed in the incubator and kept at 37° C., they all showed abundant normal growth after twenty-four hours of the choleraic bacilli and of the typhoid bacilli respectively.

(Signed) E. KLEIN, M.D., F.R.S.,
Professor of Bacteriology at the College of State Medicine, London.

LABORATORY AND ASSAY OFFICE,
75, THE SIDE, NEWCASTLE-UPON-TYNE,
July 6th, 1889.

I hereby certify that I have analysed a sample of the "St. Bede Disinfectant," manufactured by Messrs. The St. Bede Chemical Company (Limited), Newcastle-upon-Tyne, and that I find it contains as follows:—

Per-Chloride of Mercury	4·01 per cent.
Free Sulphuric Acid	4·10 ,,
Sulphate of Soda	87·25 ,,
Sulphate of Lime	1·30 ,,
Oxide of Iron, &c.	0·27 ,,
Chloride of Sodium	0·21 ,,
Insoluble Siliceous Matter	0·24 ,,
Thymol, Eucalyptus, Indigo, and Water	2·62 ,,
	100·00

The principal active ingredient of this disinfectant is Per-Chloride of Mercury (corrosive sublimate) which is known to be the most certain and powerful destroyer of disease germs. When the "St. Bede Disinfectant" is dissolved according to the instructions given it forms a solution of the strength and character recommended by Dr. Buchanan, the Medical Officer of the Local Government Board, as being effective as a disinfectant. It is prepared and packed in a form which makes it convenient and easy to be used.

(Signed) JOHN PATTINSON, F.I.C., F.C.S.,
Public Analyst for Newcastle-upon-Tyne.

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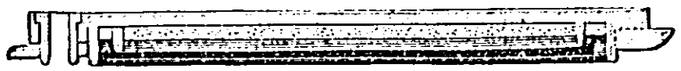

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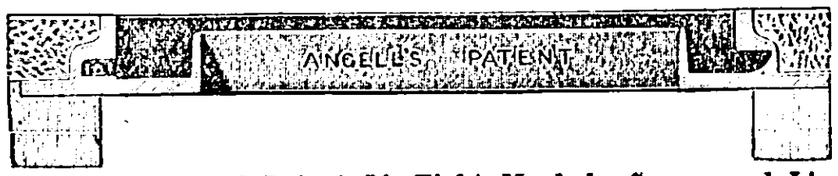

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P. CALDWELL SMITH, M.A., M.D., D.P.H., Camb.,
Lecturer on Hygiene, Western Medical School, Glasgow.

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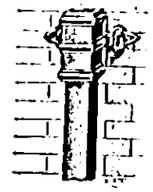

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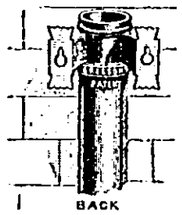

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