[Causes reducing the effects of sanitary reform] / by Daniel Noble.

CAUSES REDUCING THE EFFECTS OF SANITARY REFORM.

A LECTURE

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If we contrast the present state of Public Opinion on sanitary topics with that which obtained some thirty years ago, we shall be very much struck with the beneficial progress which it has made. A generation back, such things as ventilation, drainage, and purity of air, had little or no interest for those who were outside professional or scientific circles. It would appear that the Act for the Registration of Births, Deaths, and Marriages, which came into operation in 1837, was the first circumstance that led to any systematic investigation, in this country, of questions affecting public health. By collation of data yielded by this system of Registration, it soon became known that the number of deaths in proportion to population, was less, as a rule, in country places than in town districts; and that the average age of death was much less in crowded populations than in those that were scattered,—a result which, it was found, was in great measure caused by an excess in the mortality of young children.

A consequence apparently of these facts becoming known, was that about the year 1839, a parliamentary committee of inquiry into the health of towns was appointed to investigate this matter, and facts were brought out that seemed to be quite competent to explain the prevalence of an undue amount of sickness and mortality in our large cities and towns. The results, however, of this

inquiry, shut up in Blue Books, did but little to provoke popular attention until the year 1842, when the Sanitary Report of Mr. Edwin Chadwick, at that time Secretary to the Poor Law Commissioners, was published in a large volume, and widely distributed. This Report utilised the information already obtained by the Parliamentary Committee, and at the same time added very importantly to the materials. Facts were obtained from Medical Officers of Poor Law Unions, from Hospital Physicians and Surgeons, and from numerous other persons in any way likely to furnish suitable information, and the result showed, in striking detail, how defective drainage, insufficient ventilation, overcrowding in low lodging-houses, impure air, and uncleanliness, were powerful agents in the production of an inordinate amount of disease and death in populations amongst whom ignorance and indifference as to such things allowed of their existence.

A Royal Commission, in further prosecution of the Inquiry, was next appointed, prominent amongst whose members was Dr. Lyon Playfair, who, in 1843, visited Manchester, and prosecuted the investigation with characteristic energy and discrimination. On this occasion, I had the honour of sharing his labours to some extent. The Commission at large finally issued its Report, which substantially corroborated, whilst further illustrating, the conclusions embodied in previous Reports. At length, the Press took the matter up, and public opinion became at length aroused, and began to occupy itself with questions of Sanitary Reform.

In 1847, an Epidemic of Fever, unequalled in its severity within the present century, exhibited itself in many parts of the kingdom; and this, by the time it had pretty well exhausted itself, was followed by an epidemic of Malignant Cholera, in 1849,—a visitation exceeding in its fatality any that had gone before, or any that have happened since that date.

All these circumstances operated so powerfully upon the public mind, as to bring about a general conviction that the legislature should step in and make such laws as would secure some efficient administration in dealing with disease and mortality, so as to reduce the same by preventive measures.

Legislation ensued; yet, in the first instance, Acts of Parliamenc were little more than tentative, and their practical value was greatly reduced by being in many cases simply *permissive*; that is to say, local authorities were authorised to do certain things in the interest of the public health, if it seemed fitting to them that they should do so. Of coactive agency, however, there was but little

for some years. But of late, advance in public opinion—that almost essential antecedent in this country to all useful changes—has caused the legistature to be more decisive; and, at this time, it may be said, that many useful enactments have been obtained, which have authorised, and do authorise, great improvements in modes of dealing with sanitary matters; and, in many respects, the enactments in question are of a compulsory character. It should also be said, that in many parts of the kingdom, local administration has of late been much more emphatically and energetically exercised than in the earlier stages of the movement.

It is not my intention to occupy your time by any more detailed account of the history of what has been done in sanitary legislation and administration. I have introduced this much as having some bearing upon what I propose to say in the sequel.

Now, it is familiar knowledge that of late years drainage, in many parts of the country, has been greatly improved—that cellar-residences have much diminished—that streets have become widened, so that better ventilation may so far be secured—that the lower classes of dwellings have been better constructed—and that vagrant lodging-houses have been placed under such police regulations that over-crowding and uncleanliness are very much abated. Moreover, supplies of pure water have been pretty well secured to almost every household, I believe, in many of our cities and towns; and to maintain and promote these ameliorations there have been appointed Medical Officers of Health, exercising a certain supervision and jurisdiction in most parts of the kingdom. Indeed, anyone acquainted with the condition of things in our larger populations thirty years ago, must now, in contemplating modern improvements, be greatly struck with the alterations for the better which have been accomplished—purer air for breathing, less contaminated water for drinking, and accumulations of polluting refuse rendered illegal, and, in consequence, largely prevented. These results, I mean, have to a great extent been attained, so far as they have had a dependence upon law and administration.

Now, after so much has been done, what is the outcome of it all? How has it influenced the public health, so far as this can be determined by the rate of mortality? It is regrettable to find, on consulting the death registers, that mortality, in most parts of the country, is but little diminished, and in many places not at all. It is true that, here and there, a striking reduction has been shown to have followed decisive sanitary measures; but, upon more

careful investigation of these cases it has often been found that the reduced mortality has ensued upon a period wherein there had been an excess, sometimes ascribable to unwonted summer's heat or winter's cold, and at other times to a prevalence, over one or more years, of a class of epidemics that would appear to be comparatively little under the influcence of sanitary conditions, and which include diseases such as measles, scarlatina, and whooping cough; and it obtains, as a rule, that a high death rate brought about by such causes is always, *cæteris paribus*—other circumstances being the same—followed by a rate that for a while shows a reduction. But, quite independent of such considerations, a reduced mortality has ensued upon the demolition of courts and alleys, with their wretchedly confined houses and cabins, and a replacement of these by a superior class of dwellings arranged in wider streets. But then, in dealing with such published instances analytically, it has often been discovered that, after the beneficial change, the inhabitants have been of a higher class, whose habits have been of a better order—a fact rendering it at least uncertain how far the local improvement and the lower mortality in these instances have stood related in the way of cause and effect. Speaking generally, however, it may safely be asserted that, let the case be as it may in particular examples, the sure and unmistakable results of all that has been done, have not been so marked and decisive as sanitary enthusiasts had been led to anticipate.

And yet, it is undoubted that the sanitary improvements which have been accomplished are such as in their nature ought to have diminished mortality and sickness; and it is only reasonable that disappointment should be experienced that more obvious benefit should not have been more apparent in a reduced death rate. Wider streets, cleanliness, good drainage, and pure water, do certainly elevate the conditions of health and longevity; and, accordingly, when such amelioration is not followed by its fairly expected consequences, there must surely be causes somewhere competent to explain an anomaly so remarkable. For my own part, I am of opinion that we have not very far to go in search of the causation before we shall find it.

I can only attribute this at least partial neutralisation of the good effects of sanitary measures, to the thoughtless action and the perverted conduct of the people themselves in too many instances, in omitting duly to correspond with what the legislative and local authorities have done for their advantage. For it is clear, that whatever be the good you would render to individuals

or to the masses, it can only be made fully available by suitable co-operation on the part of those for whom it is intended. Legislation can do its part, but not, I apprehend, the greater part:

> "How small, of all the ills mankind endure,
> That part which laws or kings can cause or cure."

We will now examine this question somewhat more particularly. And I would premise by asking, what can the most perfect sanitation, so far as it depends upon measures of public authority, do for the health and longevity of a community, if the individuals composing it systematically contravene the same? And now I would ask, has there been, since the commencement of modern sanitary legislation, any such deterioration in the habits of the people at large, as goes in itself to show that individual disregard or mismanagement of health has proceeded *pari passu* with public concern for the same? I fear we must answer this latter question in the affirmative. For, what do we see? Why, with rapidly increasing riches in certain classes, there is noticeable a corresponding advance in luxury and dissipation, and a more general recklessness in the economy of health—late hours, high feeding, painful eagerness in the race for what is called success in life, distressing anxieties, jealousies and envies as to social position. It needs no physician to tell how these things operate prejudicially upon the welfare alike of individuals and the community. Philosophical historians have loved to trace a connection between the advances of wealth and luxury and the decline of national energy and vigour. We are told, and I suppose it is true, that the Roman Empire at no time abounded more in material goods of every kind, including sanitary arrangements of a very high order, than in the age immediately preceding its decline. The poet says:

> "Ill fares the land, to hastening ills a prey,
> Where wealth accumulates, and men decay."

Let us now go to the lower sections of our social system and what shall we find there? Anything, certainly, rather than conduct in conservation of health, corresponding with all that has been done by the legislature. I doubt very much whether, within lower class dwellings, there is much greater attention to cleanliness and ventilation than there was a generation back; at any rate not, I believe, in any proportion to what is the case in the exterior environment. And I suppose that, in the preparation of food

and in regard of the times when it should be taken, a thought of health but rarely comes in. I very much fear, moreover, that all which of late years has been done in reduction of the hours of labour has, in too many instances, only led to increased recklessness in dissipation and debauchery. Amongst advancing evils destructive of health, drunkenness notoriously plays a fearful and prominent part. And if all these things be so, how is it to be expected that returns of sickness and mortality should do otherwise than disappoint expectations as to the result of sanitary measures?

I will now say a few words as to what constitutes the agencies which promote health and longevity, and then we shall have a clearer view as to the mode in which sanitary measures are beneficial in themselves, and also as to the way in which their special advantages may be neutralised by the action of individuals.

Now, speaking generally, I would say that mental calm, pure air, and suitable food taken at proper intervals, with moderate but systematic muscular exercise out of doors, form essential factors in the maintenance of a sound mind in a sound body, the general prevalence of which character of mind and body would realise the desiderated state of health in the community. These factors constitute the special agencies having a definite relation with the human organism, which, in their absence, must certainly deteriorate and prematurely perish.

In order that this view of matters may be brought out more distinctly, I will now deal with the question somewhat analytically, and will say a few words under three separate divisions, corresponding with the great cavities of the body, the head, the chest, and the abdomen.

The cavity of the head, as everyone knows, contains the brain, and nobody needs to be told, that for the enjoyment of true health a sound brain is essential. It constitutes in itself, a sort of reservoir of life-power; and, moreover, there is every reason for thinking that, by its instrumentality, the intelligence and the emotions are exercised and come into play. But for maintenance of the health of this organ, its energies must not be too largely drawn upon, either by undue intellectual effort, by unwonted anxiety, or by unlawful concessions to the passions; studious thought should not be too sustained and persevering, and emotion should not be overwrought. Legislation and voluntary arrangements have alike done much of late years for securing leisure and mental relaxation for the working classes, and in this way supplied favourable oppor-

tunities to well-disposed persons for maintaining a healthy condition of the brain, and its dependent structures, the nerves. And, for all ranks, railways and increased wealth have operated very much in the same way. And in this context should be mentioned the institution of public parks in many of our cities and towns, and notably in our own neighbourhood.

But have the opportunities thus afforded been properly met by the people at large? Have not dissipation and exhausting fatigues, in too many cases, gone far to combat the beneficial effects which leisure wisely employed might have justly been expected to cause? And has not the increase of riches within the last twenty or thirty years, and a concurrently greater eagerness in their pursuit, very much tended to damage the brain in numberless cases, wherein a career of greater moderation and calm would have promoted a higher health, and a superior happiness? Practical physicians have constant opportunities of seeing such mischiefs as those which here I do but glance at; prevailing, moreover, to an extent of which neither blue book nor newspaper can give the account. And this is the case, I believe, to a degree much beyond what was reached a generation back. I would say, also, that these things not only lower vital tone and shorten the proper life, but influence in an especial manner the physical integrity of offspring, and thus indirectly deteriorate health and cut life short.

The middle chamber of the human frame, so to say, the Chest, contains the Heart and the Lungs; and these, of course, have an especial need, to ensure their healthy exercise, for suitable conditions of the atmosphere. The right side of the heart propels the blood through the lungs in whose intimate structure it becomes re-vitalised by the oxygen of the air inspired, and then, returning to the opposite side of the heart, in receives a contractile impulse by which it is circulated through the body, repairing its waste, and receiving its effete materials. Hence it is plain how important is the part which the atmosphere plays in the promotion of health, since by its direct agency the purity of the blood is kept up. And, as a matter of fact, improvements in ventilation have always constituted a leading aim in sanitary legislation, and nobody can doubt that very substantial gains have in this way been obtained. As I have before said the crowding in low lodging houses has been much less, and residence in cellars has been greatly diminished, and in most large towns, I believe, is in process of extinction; and these form striking advantages, as contrasted with a past state of things. Still I suspect that neglect of domestic cleanliness,

inattention to house drainage, and the closing of windows, in the inferior class of houses, go some way to neutralise the full measure of consequent good, which otherwise would have been recognizable And there is another deteriorative agency affecting the respiration, in operation, I fear, in every division of society; I refer to the increased and increasing prevalence of the pernicious custom of tobacco-smoking, far more injurious to health than is the much and justly denounced coal smoke as ordinarily vitiating the atmosphere of towns. No doubt many smokers seem to have excellent health: drunkards also for a time; yes, and the inhabitants of very badly conditioned houses and streets very often exhibit the same phenomenon. But to remind one of these things is no just answer to the assertion that drinking is ruinous to health, and that certain places of residence are unhealthy. The fallacy of appeals in this way to merely popular experience might easily be shown; the present, however, is not the occasion for doing so. I will, yet, say this: Do not assume that there is immunity because the sensibly injurious consequences are not immediate. May you not, in language appropriate in a commercial community, be drawing bills, which at a later period will be presented with compound interest? Let the case, however, be as it may, I cannot doubt that the habit of smoking on the large scale now practised—even among boys—must tend in no slight measure to deteriorate health, and so rank among the circumstances which obstruct the beneficial agency of sanitary measures.

If we now descend to the inferior cavity of the system, containing the stomach, and other organs which concern reparation of the waste always going on, I would repeat, that duly prepared food of good quality, taken at regular intervals, should be had, in order to secure habitually a healthy state of the blood. All medical practitioners know that the digestive and other functionally associated organs, when mismanaged, constitute the *fons et origo*—the spring and source—of a very large proportion of the several ailments which they are called upon to treat. In this regard, however, I see no cause for thinking that with the people at large there has been any deterioration—rather the contrary, perhaps—because the more nutritious and strengthening forms of diet, of late years, have been more attainable, owing to the lower price of bread and higher wages of labour. Yet I apprehend that much that has been gained in this respect, has been lost by ravages of the drink-demon which, there can hardly be a doubt, go on increasing year by year—a fact which is shown by statistics

on every side. And the results of drunkenness in the production of disease and death are much more immediate and obvious than similar effects brought about by other causes; witness delirium tremens, madness, paralysis and apoplexy, liver complaint, diabetes, Bright's disease so called, and many others—the disastrous issues of alcoholic abuse. I must confess that I do not myself see the way to any material abatement of these evils, unless they receive some *exterior* check. Drunkenness, indeed, in its destructive consequences to health and life, surpasses every other evil; it pervades, more or less, all classes—both sexes even—for, sad to say, women now very commonly become addicted to this degrading vice. It is truly lamentable to see how, by large numbers of the working classes, recreative occasions for the good of mind and body are but too often turned to their ruin through excess of every kind. Excursions to the seaside, and other such places constituting the delight of health-seekers, are now within reach of the poorest. Is it not a fact, however, that cheap trips, so called, are but too often inverted in their consequences by perversity of the trippers? Bad beer, worse gin, tobacco fumes, and riot constantly antagonise the beneficial influences that ought to flow from these excursions, which would seem in these days to have become a sort of institution. In recapitulation, I would then say that restless discontent, irregular hours of sleep, and habitual anxiety directly work mischief to the brain; that the lungs and heart specially suffer from neglect of indoor cleanliness and due ventilation, without which a sanitary environment loses much of its advantage; that the fumes of tobacco do not part with their deleterious qualities, breathed even in the well ventilated residences of suburban districts; and, finally, that alcoholic abuse ruins the digestive and assimilative apparatus, poisoning the blood, and, in its ulterior consequences, superinducing premature senility as well as disease and death.

All who have given their attention to sanitary subjects are aware that unhealthy localities are almost always signalised by a high death rate among young children; so much so, indeed, that the amount of infant mortality may be said to form a not unreasonable index for pronouncing upon the general health-condition of particular places. In such districts, numberless feeble creatures seem born only to die; sometimes shortly after their birth, and, in other instances, after dragging on a wretched and ricketty existence for a very few years. Under these circumstances, I cannot bring this address to a close without at least glancing at the causes of this so miserable a state of

things. Ill regulated feeding, neglect of the children's well-doing through carelessness or indifference on the part of their mothers, drugging them with opiates to keep them quiet, and the commitment of them to incompetent nurses—all these things bring about fearful ravages, and are largely answerable for the high mortality of infants. Drunkenness, directly or indirectly, more than any other cause, brings about this great wrong done to helpless innocents. And now I shall use but few words, but these I would emphasise, when I say that feebly-born children who come into the world only to meet with an early death, owe their sad condition but too often to drunkenness and other shameful vices on the part of parents. In scriptural phraseology: "The fathers have eaten sour grapes, and the teeth of the children are set on edge." And I would appeal to the common sense of all now present, whether it is reasonable to expect that exterior drainage and widening streets can sensibly reduce disease and death in the case of young children thus physically ruined by the sins of those through whom they come into the world? But this is a subject hardly fitted for any extended discussion on an occasion like the present.

It has been the intention of this address to be general, and so unavoidably discursive. I have not even attempted then to look at the whole question on every side, or indeed on any side in any detail; and it is not improbable that some of my auditors may conceive that I have taken but a one-sided view in what I have actually said. Yet I do not think so, for how stands the fact? If figures representing the mortality of most parts of the country be examined over a series of years—say five or seven—they will not show a sensibly reduced death rate. I say a series of years, for, as I have already implied, single years do not give the required cycle. And if the examination in question be made, I am confident it will be found that I have neither been one-sided nor have made over-statements.

I must ask you to be good enough to accept, on trust, a great deal of what has been said that might have been corroborated and illustrated by statistics. I have spared myself the time and the trouble involved in looking them up, because I have commonly found that, in a popular address, they rarely obtain any due consideration; that, indeed, the attention of listeners reluctantly tolerates the strain which they put upon it. Yet there are figures, I know, that substantiate all of importance that has here been advanced, and I must trust to your kindness for dispensing with them upon the present occasion.

The last thirty years, on the whole, have been times of wonderful prosperity, and have supplied facilities for all sorts of good, but for evil also. And it does so happen that sanitary improvements have been very much concurrent; a coincidence that gives a very sunny aspect to one side of the shield—but then advancing luxury and drunkenness cast shadow and gloom on the other.

I would guard myself against any imputation of what is called *pessimism*—of being supposed to regard everything about us as being of the worst. I am not at all ambitious of being deemed a Croaker, and still less a Cassandra; for I feel very strongly that, with all the evils that are to be noted in the present age, but few amongst us would like to revert to a past state of things. What amazing progress have we of this generation witnessed in all that concerns the material gain of society! And was there ever an era wherein there was more earnest anxiety to promote the well-being of every-class in the community? It is yet a curious thing to notice how, after the manner of electric polarisation, an elevated condition of things tends, as it were, by contiguity to give prominence to its opposite. When you see accumulated wealth, how often do you see near it poverty the most abject; how frequently is brought out heroic virtue, as if by the proximity of vice; nay, in the matter of religion is it not said :—

"Wherever God erects a house of prayer,
The devil always builds a chapel there."

And so with sanitary matters; we have vast improvements on the one hand, and on the other deterioration—the outcome of ignorance and depravity; showing how

"Every white will have its black,
And every sweet its sour."

I am somewhat afraid that, at the present day, there is an undue disposition to exalt the powers over society of governmental administration. The aggregate of human beings do not form a mechanical structure over which external agencies and forces have absolute control; neither can such aggregate, considered as society, be in any strict sense regarded as an organism on which we can operate according to definite laws. In so regarding the influence of possible sanitary improvements, Dr. Richardson, it seems to me, has been misled when, in sketching his particular Utopia—his imaginary Hygieopolis—he lays it down as at least theoretically possible to construct a city so that its annual mortality shall not exceed five for every thousand inhabitants. I suppose it will be generally conceded that every human being who is of sound mind and mature years has a certain faculty of independent action by which he can

oppose himself to the influences about him; and he does not lose this faculty where, as a social unit, he is in the midst of his fellows —he has Intelligence and Will, and he is consequently free, if so minded, to contravene the very best efforts made in his favour. Thus, whatever advantages you offer to individuals or to society, may they not be rejected? And in all this action and reaction, there is nothing mechanical, nothing that is strictly organic.

Of course, a great deal of the absence of co-operation with what has been done for the popular benefit is attributable to ignorance of large masses of the people on all these subjects; and it has been with an intuitive apprehension of such being the case that the Manchester and Salford Sanitary Association, from an early period of its existence, has instituted lectures, which have year by year been delivered in different parts of this city, in order that such a knowledge of health requirements should be diffused as would enable individuals, in their own interest, to correspond with legislatorial and administrative purposes and intentions—and the same course will have place during the ensuing season—lectures will be given by competent persons, who doubtless will explain in detail much that has only been hinted at in the present one, the object of which is merely to serve as an introduction to the whole series.

In conclusion, I would bring out somewhat more distinctly the problem whose solution, in some degree, I have this evening attempted. A certain difficulty presents itself: important measures have, at great cost and after much laborious inquiry, been adopted, aiming at a diminution of the death rate all over the kingdom—measures which must certainly have exerted some influence in this direction. And yet statistics have scarcely shown more than negative results. In this state of things it was impossible not to ask one's self the question—Whence this anomaly? How comes it about? Analysis and reflection have presented to my apprehension some however imperfect an explanation, and this I have rather sketchily brought before you on the present occasion. If, however, a more satisfactory solution of the problem can be given, I shall gladly accept it; otherwise, I must adhere to that which is embodied in this address. As Horace has it—

* * * *Si quid novisti rectius istis,*
Candidus imperti; si non, his utere mecum.

Words thus rendered by Francis—

* * * "*If a better system's thine,*
Impart it frankly, or make use of mine."

SEEDS OF DISEASE.

Ladies and Gentlemen,

For more than 20 years you have had in your midst a society of men who have banded themselves together under the name of the "Manchester and Salford Sanitary Association,"—men who have voluntarily met frequently in council, who have investigated many things relating to the health of the town, and who have taken much labour in spreading among the people a knowledge of the laws of health. For the last 13 years also, they have had associated with them a number of public-spirited medical men who have regularly, week after week, supplied the community with exact and reliable information as to the amount of disease occurring in the town, and the precise localities where it prevails.

It may well be asked what all this activity means—and what is the hope that has carried the Association so far on its course.

The answer is not far to seek. The intention of these many workers is the alleviation of suffering, misery, and disease; their hope is that of saving life. When we remember the grounds upon which the Association was first started, it will not appear wonderful that some of the more thoughtful of the community thus interested themselves in the condition of the town. At the commencement of this period the stern figures of the Registrar-General, showed that, in Manchester, the inhabitants were dying at twice the rate of some other towns in proportion to their total population, and that some diseases carried off 20, 50, 100, or even 200 per cent. more than the ordinary proportion of persons. Many thousands of the people were thus carried off by diseases that might be, and ought to be, prevented. As a great poet has said:—

> "To see it down in figures on a page—
> Plain, silent, clear, as God sees thro' the earth
> The sense of all the graves—that's terrible
> For one who is not God, and cannot right
> The wrong he looks on."

Coincidently with these sad records there also appeared statements, both by medical men and by the Health of Towns Commission, showing that the places where these people dragged on their wretched existence were teeming with all kinds of sanitary

evils, and that in many places they were utterly unfit for human habitation—large districts of Manchester made up "of narrow, winding streets, with close courts and alleys, and back-to-back houses, all over-crowded with inmates, with faulty drainage and open and fœtid cesspits." It is not surprising that disease and death, and all kinds of moral evil as well, should flourish in such a place as this, or that men should have felt it—

> "Agonizing with a ghastly sense
> Of universal hideous want and wrong."

Much has undoubtedly been done to amend some of these evils, but much remains to be done. The death-rate of Manchester is still appallingly high, and although the mortality amongst adults was slightly less in the past decade than in the one preceding it, the infant mortality—"the massacre of the innocents"—is even greater than before.

But it may be asked, and indeed the question has been put, why not leave all sanitary reform to the constituted authorities who have power to carry it out? Why should the Sanitary Association still busy itself with these matters? Not long ago a cry was raised by the Association for the appointment of a Medical Officer of Health, and now that the request has been granted, why should not the matter be left in his hands? Now this question is a very important one, and must be answered, and we may say at once that we are very grateful for the appointment of these Health Officers, and for the zeal with which both they and many members of the municipal body work for the physical well-being of the people, but there are several very weighty reasons why the Sanitary Association still needs to be carried energetically along.

1. Because it is not the function of the Corporation to investigate questions of sanitary science, nor to invite discussion upon its principles. It has been rightly said, that the Association has no executive power. But on this very account is it the better fitted for careful and dispassionate inquiry, into the many subjects of controversy which are sure to arise in the promotion of sanitary reform. As it was well remarked in the second report of the Association, p. 17: "It is not the duty of any executive body to act upon suggestions for improvements, which involve the outlay of public money before they have been discussed in all their bearings, and hence an Association like the present may render important service, by bringing under public notice many sanitary improvements which, without their assistance, might remain unnoticed.

2. Again, few persons will doubt that the mere carrying out of the mechanical portions of sanitary work would have but little effect, without the direct teachings of sanitary laws, and without education, the best devised, the most perfect model dwelling would soon be made unfit for habitation ; a palace might soon be turned into a pigstye. This work of teaching must be carried on, and it is energetically pushed forward by this Association, by all the means in its power, by publications, by discussions, by lectures, by tracts and cards, and by its weekly reports on the health of the town.

3. It is in this way that the Association can give no small help to the constituted authorities of the community. From the first its aim has been to induce co-operation with these bodies, and its past history would furnish many instances in which, from its independent position, it has been of considerable assistance to them, and its influence is all the greater in this direction, because it is not bound to agree, and indeed has not always agreed, with everything that these authorities have done or wished to do. It is a healthy thing for this city, to have within it an independent body of men, without suspicion of any sordid or narrow motive for its criticisms. Moreover, the Association has the power of associating with itself all those who are interested in sanitary reforms, and all who have special information on any subject; and it also can bring into friendly union with itself all the medical officers of surrounding districts, who can thus not only have access to the special sources of information possessed by the Association, but who can refresh their minds with the discussion of matters of sanitary interest.

4. But perhaps the most important of its reasons for existence is the fact that as a voluntary body itself it is able at present to obtain information which could not be got by any public officials. People will give information to a benevolent society like our own, which they would not supply to others, and we may point to the weekly returns of disease as one notable instance of this fact. The long series of important original investigations carried on under the auspices of the Association, testifies to the position it holds amongst medical men and men of science.

But it is no part of my intention to drag you, for the whole of this hour of lecture, at the chariot-wheels of the Association. It would be impossible to detail to you all the matters upon which it has been employed ; they are too numerous, and many of them too technical, and, I will add, too repulsive, to interest a general audience. I propose, therefore, to take up only one branch of the

work, and in order to place it as clearly as possible before you, I have chosen as the title of the discourse, "*Seeds of Disease.*" Under this name I wish to speak of certain sources of disease and death, and the means by which they may be prevented. In one sense, indeed, the title would include almost all the sources of mortality. We bear with us from our birth the seeds of our death. As Jeremy Taylor says, "Every day's necessity calls for a reparation of that portion which death fed on all night when we lay in his lap and slept in his outer chambers. . . . . and while we think a thought we die; and the clock strikes and reckons on our portion of eternity: we form our words with the breath of our nostrils, we have the less to live upon for every word we speak."

But we must not take our title in any such wide significance as this, nor can we include hereditary disorders, such as might be spoken of as arising from the seeds implanted in our constitutions by our forefathers, such complaints for instance as insanity, gout, cancer, or consumption, nor may I dwell upon the poison seeds introduced by intemperate habits. All these diseases must be put aside as not concerning our present purpose, which is to treat of some numerous causes of death, implanted indeed from without, but planted in a literal, if not in an agricultural sense.

It is not as a mere metaphor that I wish to use the term "Seeds of Disease." The disorders which I would bring before your notice this evening are supposed to be literally the result of the action of living organisms upon the human body, and although I cannot now enter into the question whether they are animal or vegetable in their nature, the fact that they arise from living germs is doubted by very few medical men of the present day.

The diseases in question belong to the large class of epidemic, endemic, or infectious complaints, which spread either by contact, or by the conveying of morbid particles by some common medium, such as air or water, and they have been grouped by the Registrar-General under the one head of zymotic, or ferment-caused diseases, a title derived from the Greek word ξύμη a leaven or ferment. I need hardly say that they include such complaints as small-pox, scarlet-fever, typhus, typhoid, diphtheria, measles, whooping cough, cholera, &c.

And a fearful harvest does death gather as the produce of these deadly seeds. The history of the epidemics of the middle ages, as given by Hecker, is one of the most fearful and murderous that can be imagined, the numbers carried off by them far exceeding those slain in the most bloody war ever carried on. Read the

account given by Boccaccio of the ravages of the Black Death. In Italy three-fourths of the population died of it; in Paris, 50,000; in London, at least 100,000; in Norwich alone, 51,100; and even these examples fail to give a true picture of the devastation that took place. The average loss to the whole of Europe is said to have been one-quarteer of its entire population. Boccaccio says, speaking of Florence: "When the evil had become universal, the hearts of all the inhabitants were closed to feelings of humanity. They fled from the sick and all that belonged to them, hoping by these means to save themselves. Some shut themselves up in their houses with their wives, their children, and their households, living on the most costly food, but carefully avoiding all excess. Others carried their precautions still further, and thought the surest way to escape death was by flight. They, therefore, left the city; women as well as men abandoning their dwellings and their relatives, and retiring into the country. But of these, also many were carried off, most of them alone and deserted by all the world, themselves having previously set the example. Thus it was that one citizen fled from another, a neighbour from his neighbours, a relation from his relatives, and in the end, so completely had terror extinguished every kindlier feeling, that the brother forsook the brother, the sister the sister, the wife her husband, and, at last, even the parent his own offspring, and abandoned them, unvisited and unsoothed, to their fate."

Smallpox, again, has carried off its hundreds. and tens of hundreds of thousands. Before the discovery of that beneficent resource, vaccination, we are told by Dr. Barlow, one of the lecturers of our Association, that its share in all the deaths was one in every ten, and that of children under ten years of age one-third were its victims. As Lord Macaulay has said, "The smallpox was always present, filling the church-yards with corpses, tormenting with constant fears all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the bethrothed maiden objects of horror to the lover." And in other countries its ravages were even worse than the plague; Iceland, we hear from Dr. Simon, was nearly depopulated by it, and in North America whole tribes of Indians were swept away. "In Mexico it even surpassed the cruelties of conquest, suddenly smiting down $3\frac{1}{2}$ millions of the population, and leaving none to bury them." "In Brazil, in the year 1563, it extirpated whole races of men, and about the same

period, in the single province of Quito (according to Dr. la Condamine), it destroyed upwards of 100,000 Indians. We have nothing in these days at all comparable to such fearful havoc as this ; but still in our own country—even in our own town—many thousands are every year made the prey of these deadly foes.

Look at the deaths which have resulted in Manchester from four epidemics only, (see Table II.) and remember that for every death at least six persons have suffered from the disease, in other words that six times the number of cases here recorded have occurred and have carried with them all their long train of suffering and expense and subsequent ill-health. These are the figures for only one town in the Kingdom.

The figures for England and Wales are also limited to the four principal zymotic diseases. (See Table II.) When all kinds of these complaints are included, the sum rises to a still higher total. In a recent parliamentary paper, moved for by Mr. W. H. Smith, it is stated that whilst the population of England and Wales is over 22,000,000, and the total mortality is under 500,000, the deaths from epidemic diseases amount to upwards of 111,000 annually. Here, then, is ample work still to be done ; at least one-fifth the deaths, or 100,000 persons, to be saved every year. It will be allowed that there is need to study the causes of such an amount of mischief, and, if possible, obviate them.

And first as to the mode of origin of these complaints. In the old days it was supposed they originated in pestiferous subterranean exhalations. As Sydenham says : "They originate neither in their heat nor in their cold, their wet nor their drought, but they depend upon certain hidden and unexplicable changes within the bowels of the earth."—*Med. Observ., chap. II.* 5.

Nowadays, however, they are regarded as the work of parasitic beings, and as propagated by germs or seeds. But what proof can be given that epidemic or infectious diseases are at all like a leaven or ferment, such as yeast, or that they are spread by means of seeds or germs? Has any one ever seen the substance, the disease-entity, which produces their symptoms? Has it been recognised as such in any case on record? Have its seeds or germs any existence except in the imagination? A few years ago, to all these questions we must have answered "No!" but now, thanks to the labours of a few scientific physicians, we can answer them boldly in the affirmative. Dr. Lionel Beale, Dr. Burdon Sanderson, and one or two other eminent physiologists, have been able to detect and to demonstrate some of these "seeds of

disease." By using microscopes of great power, by employing lenses that will make a single hair appear a foot in diameter, and an object one inch long 250 feet in length. With such powers as these, or very little less than these, they have been able to discover in the matter of small-pox, or the cattle plague, in relapsing fever, and several other diseases, objects which are believed to be the true infective particles. These observations are, however, of recent date. How then could the Registrar-General many years ago venture to give the name *zymotic* to this group of diseases? There is such a thing as circumstantial evidence, and although it is inferior in power to direct ocular proof, it was in this case, I think, quite sufficient to justify the theory, even before the seeds of disease were themselves actually seen.

And first as to the living nature of the morbid poison. Let us suppose that a naturalist finds in his garden an object hitherto unknown to him, that upon studying it, he learns that it goes through certain changes in successive definite periods of time, and that it grows, not by adding to itself particles of its own kind, but by converting surrounding diverse material into a substance like itself. Let him further discover, that at a certain period of its growth, it has the power of giving off some kind of influence, by which other bodies, like itself, are produced at some distance from its home, and that this influence needs a definite and unchangeable period of time in which to develop, and that when developed, the result is an object, or a number of objects, in every respect the counterpart of the original, which go through the same changes, have the same habits, and again repeat the process of reproduction. No man, accustomed to observe the ways of living beings, would hesitate to pronounce at once, that this object was a living being, nor would he doubt that it had propagated its kind, either by seeds or germs, or by something more subtle, but analogous in its nature.

But this is closely the state of the case with regard to epidemic diseases. It is true that the object is invisible to the eye, but yet from the course of any one of these diseases, we can affirm that all the points relied upon by the naturalist, to prove the living nature of his new found treasure, are present in the evil beings, which take possession of suffering patients. Each of them shows regular and definite changes within fixed periods of time. Each has a limited term of life. Each feeds upon its victim, and from his flesh and blood forms fresh material like itself, and at a certain period in the disorder, each throws off particles, which, if they

fall upon suitable soil, grow and flourish into a disease as truly bred from the first, as if had been a plant as definite as an oak, or an animal as well marked out as a horse. But there is a still stronger evidence of the likeness of these disease parasites to the lower forms of animal or vegetable life, and this is that they are produced and fostered by the same conditions, and that they are prevented or destroyed by the same, or closely similar means.

First, as to their production.

When the naturalist before mentioned finds a living plant, whether in his garden, or in some very out-of-the-way place, even in a lonely and desolate coral island, just emerging from the ocean, he concludes at once that the seed, from which this plant has sprung has been conveyed there, either wafted by the winds, or floated upon the water, or carried by some bird, or even insect, and he would certainly be right in his conclusion if the plant were of the ordinary flower-bearing kind.

But the case is not so simple when we come to deal with moulds and fungi, and microscopic forms of life. There has arisen, especially of late years, a school of experimenters, who affirm that many of these minute organisms arise spontaneously under suitable conditions, and who challenge their opponents to show how, in certain circumstances, any other mode of origin is possible. The fact that this theory is sustained by men of science of great eminence in Germany, France, and England, is sufficient to prove the difficulty of the question.

Now, the only means of meeting this opinion, is by the almost equally startling doctrine of Panspermism, as it is called, that is, that every drop of water, and almost every cubic foot of air, at least in the lower regions of the atmosphere, contain germs of life, ready to sprout forth into full growth, as soon as they find fitting soil in which to flourish.

It is no part of my duty to discuss here the theory of the spontaneous evolution of living beings, nor would I venture for a moment to deny the possibility of such a process; but, on the other hand, to my mind, the proofs are overwhelming that Panspermism is true, that both air and water are teeming with living germs, and that it is truly from them that most, if not all, these leavens or putrefactive ferments take their rise. The idea of the presence of ferments in the air is, however, not a new one: thus Boyle, writing in the 17th century, says, "those parts of the atmosphere which, in a stricter sense, may be called the air, are in some places so intermixed with particles of different kinds,

that among so great a number of various sorts of them, 'tis very likely there should be some kind of an uncommon or unobservable nature."—*Boyle's Philosophical Works.*

The idea of the likeness of fermentation to certain processes of disease had also occurred to him, and he says, "He that thoroughly understands the nature of ferments and fermentations, shall probably be much better able than he that ignores them, to give a fair account of several diseases (as well fevers as others) which will perhaps be never thoroughly understood, without an insight into the doctrine of fermentation."—*Boyle's Works, Ed.* 1744, *Vol. I., p.* 476.

Again, a quaint writer, Mr. Place, speaking of the Plague, says: "When we consider what a vast deal of vapours a small thing sends out, and what a large space of air it will fill with it, and diffuse itself through, we may conceive a city thoroughly infected to be, as it were, clouded in pestilential fumes, as it would be with smoke, if on fire; and if it come near such representation, 'tis vain to ask what way men living amongst it receive the infection; whether they draw it in with their breath, or it gets into the stomach by the venom's sticking to what they eat and drink, or directly climbs into the brain by the sensory of the nose, since it is much but 'tis all these ways."—*Hypothetical Notion of the Plague, p.* 12.

Probably the first man fairly to demonstrate the existence of living particles in the air, was your own townsman, Dr. Angus Smith, but others had previously rendered the fact extremely likely; and such were, first, the naturalist Redi, then Needham and Buffon, then Spallanzani, and later on Schwann and Schroeder and Von Dusch were able, by traps of cotton wool and other means, to intercept these particles, and devise means for the preservation of meat or of sugary juices.

But the most eminent and most recent of all these observers is, undoubtedly, the great French chemist, Pasteur, and he, by a series of most ingenious and convincing tests, has placed it beyond all shadow of a doubt that the usual sources of all fermentations and putrefications, are the organic particles which float along in the water, or which fly, as "motes in the sunbeam."

Most of Pasteur's experiments were addressed to showing that when these particles are carefully taken out of the air, by subsidence or filtration, this air might be freely admitted to the most changeable, and most easily putrefying fluids which had been previously deprived of all contamination by boiling, or some other

means. No change would then take place for months, or even years. I may say that I have myself repeated many of these tests and have obtained like results, and it is a significant fact, that the more care is taken to free the substance acted upon from germs, and to exclude contamination from without, the more certain are we to obtain security from putrefication or fermentation.

Now what facts have we at all analogous to these, with regard to the origin of disease? We cannot bottle up our children in a Pasteur apparatus, nor half smother them in complete suits of cotton-wool, what is there then that can tell us of the mode in which these supposed fermentative diseases arise. We have in fact very good evidence, both inferential and direct to offer, and first, as to the manner in which the seeds of disease are conveyed.

Read the famous story of the Broad Street pump, as told by Dr. Snow, and see whether anything short of ocular demonstration could be clearer, as to the subtle nature of cholera poison when it makes its way into drinking water.

This, the most terrible outbreak which ever occurred in this kingdom, carried off in ten days, upwards of 500 people, all residing within 250 yards of this notorious pump. "The mortality in this limited area," says Dr. Snow, "probably equalled any ever caused in this country, even by the Plague, and it was much more sudden, as the greater number of the cases terminated in a few hours. It would also, undoubtedly, have been much greater, had it not been for the flight of the population." Now all this fearful havoc was traced to the water from the pump in question, and affixed to it by a chain of evidence most complete, the witness to it being, not only the fact of persons drinking the water being seized by cholera, but cases of immunity, such as that of a brewery in the centre of the district, the 70 men employed in it never taking the pump-water, and all, without exception, escaping the infection. There were also other striking instances of persons who lived out of the district contracting this disease, but who had managed to obtain some of the water. Such a case, for instance, was that of the old lady, who had not been near the district for many years, but who regularly sent for her drinking water to this pump. "The water was taken on Thursday, the 31st of August, she drank of it in the evening, and also on Friday. She was seized with cholera on the evening of the latter day, and died on Saturday." A neice, on a visit to this lady, also drank of the water; she returned to her residence in a high and healthy part of Islington, was attacked with cholera and died also. There was no cholera either at West End, or in the neighbourhood where the neice died.

The air, too, has carried its fair share of the seeds of disease. The air of the Pontine marshes, near Rome, is positively deadly in the evening at certain seasons of the year, and the great enemy with which our soldiers had to contend in the Ashantee War, was not the savage warrior whom they could meet in fair fight, but the pestilence that walked in darkness, the fever and the ague that sapped their strength, and stretched them helpless in their tents.

In our own country also, nothing is more certain than that the air from sewers, escaping from an untrapped grid, or from some small leak in the pipes, will carry with it the sources of such complaints as diphtheria, typhoid fever and dysentery.

Numberless examples of this fact could be gathered from the records of public health, but enough has been said to indicate the kind of proof upon which we rely to show the likeness in these respects, between the disease germs, and those which produce other, more or less innocent forms of fermentation. But direct evidence, as I have said before, is not wanting to us even in the case of fermentative disease.

Although it is not possible to enclose human beings, in such a manner as to shut out all approach of germs, it is easy enough to prevent these sources of mischief from approaching the surface of wounds, and surgeons have not been slow in availing themselves of Pasteur's researches to help them to keep off many fearful scourges, to which hospitals have been liable in times not long gone by. To Professor Lister, of Edinburgh, belongs the honour of having introduced a plan of treating wounds, which is called antiseptic surgery, and which is entirely based upon the principle of destroying the evil parasites in the atmosphere, and then of shutting up the wounds, so that they shall get no access to them until the open sore has been healed. The success of this method, which is now practised, not only by its illustrious author, but by many surgeons throughout the world, is sufficient to prove the accuracy of the view we entertain, as to the ferment-origin of such diseases as hospital gangrene, prevalent infection, and erysipelas.

Secondly, with regard to the influences which retard, or altogether stay, the progress of epidemic disease, our experience is still the same, those means or those agents which will stop or prevent putrefaction or fermentation, are the best, and indeed the only disinfectants. And first, as to cleanliness, ask a dairymaid, or a nurse, the best way of preventing the milk they use from turning sour, and they will both answer, that perfect cleanliness is essential to keeping it sweet and fit to use. Now dirt is ever the fit foster

parent of disease, and the lurking-place from which it springs upon its victims. The favourite haunts of cholera have been often shown to be those "fever-nests" which, unfortunately, are always to be found in our large towns, and it is well known that typhus invariably chooses the foul and overcrowded parts of our cities, in which to hatch its first broods, before swooping full-fledged upon the rest of the community.

Heat is another powerful agent in removing the causes of putrefaction and fermentation. Brewer's barm is not the only leaven that is destroyed by the warmth of a baker's oven. There are few if any ferments that will bear for any lengthened period the heat of boiling water.

Heat is also the very best *disinfectant*, a fact first demonstrated by the late Dr. William Henry, of Manchester; and your Medical Officer of Health, Dr. Leigh, has done well in obtaining the erection of the admirably appointed disinfecting ovens in Ancoats. It cannot be doubted that they will do much to prevent the spread of these diseases. All substances which have obtained a well-earned reputation as disinfectants, are also antiseptics and anti-ferments.

The metallic salts of iron, zinc, or arsenic, common salt, the fumes of chlorine or sulphur, the products of tar, to which the famous tar-water of Bishop Berkeley probably owed any virtue that it possessed, the essential oils of various kinds—all these substances will stay the progress of fermentation, and when rightly used, they will destroy the power of transmitting disease.

I have dwelt so long, and I fear tediously, upon the nature of the epidemic poison, because it is obvious that an accurate knowledge of the enemy's position is essential, before we can hope to meet it successfully or put a stop to its fearful ravages. For this is after all the important part of the subject, to answer the practical question, how to prevent epidemic diseases when they have arisen; how to stop them from spreading. Now, the realisation of the fact that we have an active living thing to deal with is a great help to us in our contest with it. In the first place it tells us the important truth that these poisons are not like those used by a physician, or such as may be found in a chemist's shop. These do not change, or at least, do not increase in their virulence, and so long as they are kept out of the way they will do little or no harm. A grain or even a pound of arsenic may be left untouched for years and it will be harmless; but if the 100,000th part of a grain of the living poison is preserved, if even a single seed is

allowed to rest undisturbed in some congenial nest, although it may not germinate at once, and may lie hid for months, yet at the end of that time, when the season or circumstances become favourable to its development, it may suddenly begin to grow, and if unchecked it may, as we have seen, rapidly spread abroad and carry destruction and desolation through a nation.

Here then is the practical lesson, that all the favourite resting places of these germs must be rooted out, and all that will foster or predispose to their growth must be done away. Hence the value of the general work of this Sanitary Association, and the urgency of its precepts with regard to cleanliness and purity in all things—in dwellings, in clothing, in person, in food and drink, and in the air we breathe. Undoubtedly much good has already been done in removing many of the lurking places of disease in this city. The abolition of cellar dwellings, the care taken both as to house and general drainage, the cleansing of the worst parts of the town, and more than all, the sweeping away of those great evils the open ashpits and their appendages. All these means must ultimately be beneficial, but they cannot be trusted to alone. Sanitary reform must be carried out still more decidedly and efficiently. Thanks to the present Government, we have in the Artisans and Labourers Dwellings Act a means of at once setting about this work. Let us hope that our Corporations on both sides of the water will soon begin to put them in force. But the teaching of the Association must be learnt not only by authorities but by individuals. No mere mechanical reform, not even the most approved engineering expedients, will avail without the active and intelligent co-operation of the inhabitants themselves.

But to come to closer quarters with our foe. It will at once be seen that with a living growing thing to deal, when once any person is attacked, in order to prevent the disease from spreading, most thorough isolation of the case must be practised, and all the processes of disinfection known to us brought into play. If the subtle creature is permitted to escape and scatter its blight through the town, then it is almost hopeless to expect to arrest its course; all that can be done afterwards is to mitigate its virulence. It was with a view to the isolation of all such cases as could not be kept separate at their own homes, that the Committee of the Sanitary Association supported, with its utmost power, the proposal of the Medical Officer of Health for Manchester to carry out Dr. Radford's plan of reception houses for infectious diseases. It is much to be regretted that the public and the municipal

authorities are still not sufficiently enlightened to carry it out. By isolation of cases as they arise, and thorough disinfection according to the best methods, it is not too much to hope that a community might ride in comparative safety through the storm of disease and remain uninjured until at least the violence of its visit had passed by.

I may mention that in addition to general efforts for the better understanding of these disorders, and for their limitation, the Committee has from time to time undertaken special labours during the reign of an epidemic or when its coming appeared to be imminent. Thus it has issued special instructions as to the precautions to be taken upon the approach of cholera; cards of directions to parents and nurses have been drawn up relating to measles, scarlet fever, and typhus; and in times of great distress regular house to house visitations have been organised and materials for disinfection, &c., have been supplied. But we ought not to rest contented with the knowledge we now have on this subject. That we are still very far from possessing perfect weapons of defence against any of these diseases, except smallpox, is evident enough from the almost constant presence of epidemic diseases amongst us, and yet the problem ought not to be one impossible to solve. As the monsters opposed to us are living things, we need to know all their habits and ways so that they may be taken at a disadvantage and overthrown. We must find out their favourite nests, their breeding places, their mode of growth, their choicest hunting grounds, their most usual food, and the victims they generally select. But on all these points, and for every one of these complaints, we need much more light, much more study, and until this is obtained I fear that we can hardly expect to be very successful in our warfare.

The Sanitary Association has initiated the only means by which this need can be met, and that is by regular and accurate returns of the presence and course of epidemic diseases. It has, indeed, done its best in this regard; more than any other body in the United Kingdom. Its weekly returns are the most perfect series of statistics of disease ever published, and they have already thrown considerable light on the subject. By their means we have been enabled to mark the course of all the epidemics of Manchester and Salford for the last 15 years, their rise and fall, and their coincidence with other surrounding conditions, the concurrence of certain atmospheric changes, and the influence of heat or cold, moisture or dryness. They have corroborated Sydenham's remarks as to

the epidemic constitution of certain years, and the singular manner in which one epidemic drives out another, "as one nail another nail expels." They have demonstrated the connection between certain localised affections of the body and epidemics affecting definite organs, and have made probable the discovery of cycles of such epidemics as whooping-cough, smallpox, and scarlet fever. All this have these returns accomplished, and much honour is due to the medical men in all parts of the town who have furnished the returns to the Association.

But more than this is required, and more has been demanded by us from the Legislature in order that a truly serviceable knowledge of epidemics may be obtained. It is not enough to know the variations of such diseases in only one town in the kingdom. If their path is to be tracked and their habits studied it will be necessary to have, not merely a local, but a national system of registration of disease. Meteorologists have long since had their stations planted abundantly all over the world, and by this means have observed to such effect the ever-changing states of the weather that they have deduced even the laws of storms and the doctrine of cycles of atmospheric states. How important would it be if we could obtain similar records of epidemics, and if these tornados of disease could be brought within our knowledge at least as plainly as atmospheric disturbances. And there is another reason for a further development of the Manchester system of regular and prompt returns of the sickness arising in any community, and this also grows out of the living character of the agent with which we have to deal. As I have said before, if its spread is to be stopped at all it must be done at the outset and it must be literally "nipped in the bud." And this can be only done in one way. Every case as it arises must be made known to the guardians of our public health as soon as its true nature has declared itself. It is in accordance with this principle that the Sanitary Association has demanded, that every case of infectious disease arising in a town shall at once be returned to the medical officer in charge of the district, in order that he may see that proper isolation and disinfection be carried out. In this way only can we hope to stamp out the first sparks of the burning danger. This demand has been recognised as just and right both by the Social Science and by the British Medical Associations. May we not hope that it will be supported by all who would wish that these plagues should cease from amongst us.

Finally, let me say a few words as to the duty of every citizen

in regard to this matter. It is not one that can be disregarded as little likely to affect ourselves; during the prevalence of an epidemic any one of us might be struck down by contagion arising from some obscure and little thought of source. Nor can it be selfishly left unheeded as one of the "comfortless troubles of the needy" that is not likely to affect the careful and well-nourished. As an old writer (Place) has said, "Epidemics are a present from the poor to the rich as a recompense for their neglect." But I will not pay you the bad compliment of urging merely the protection of yourselves and of your children as a reason for helping us. Look to the interests of our nation and of our race and judge whether it is safe to leave things as they are, or to permit disease to be continually engendered by the unhealthy conditions that surround us. We are told that in the course of time living beings gradually become fitted to their surroundings; and those who are best adapted to the scenes in which they live survive, whilst the others die out. But what are the conditions to which our town populations are thus gradually to accustom themselves? Is it desirable that they should become fitted to them? Shall we allow unhealthy dwellings to engender consumption and other tubercular diseases? Shall we look on calmly while young children are dying in thousands under the combined influence of the foul atmosphere in which they live and the ignorance and carelessness of parents? Shall we wait until the strength of our population is sapped by intemperance and vice? Let us remember rather that, as Canon Kingsley has pointed out, there is such a thing as "an inverted, unnatural selection of the feeblest and most miserable," and that it is this we are now engaged in promoting by our neglect of the beneficent laws of health. And let me state one more fact. It is not only the weak who are carried off by epidemic disease; it is often the more sensitive, the more finely bred, who give way under the poison. Scarlet fever is notoriously most fatal amongst the children of the rich, and typhus often picks out the fathers, the bread-winners and stays of their families, as its victims, sparing the weak and destroying the strong, and thus the latter die out leaving feebler organisations to carry on the race. In the eloquent words of the present Lord Derby: "Don't fancy that the mischief done by disease spreading through the community is to be measured by the number of deaths that ensue. That is the least part of the result, as in a battle the killed bear but a small proportion to the wounded. It is not merely by the crowded hospitals, the frequent funerals, the destitution of families, or the increased

pressure of public burdens that you may test the suffering of a nation over which sickness has passed. The real and lasting injury lies in the deterioration of race; in the seeds of disease transmitted to future generations; in the degeneracy and decay which are never detected till the evil is irreparable, and of which, even then, the cause remains often undiscovered. It concerns us, if the work of England be that of colonisation and dominion abroad, if wild hordes and savage races are to be brought by our agency under the influence of civilised man; if we are to maintain peace, to extend commerce, to hold our own among many rivals alike by arts and arms; it concerns us, I say, that strong hands should be forthcoming to wield either sword or spade; that vigorous constitutions be not wanting to endure the vicissitudes of climate and the labours of a settler in a new country. I believe that whatever exceptions may be found in individual instances, when you come to deal with men in the mass, physical and moral decay necessarily go together; and it would be small satisfaction to know that we had, throughout a series of ages, successfully resisted every external agency, if we learnt too late that the vigour and energy, for which ours stands confessedly pre-eminent among the races of the world, were being undermined by a secret but irresistible agency, the offspring of our own neglect, against which science and humanity had warned us in vain."

TABLE I.

Mortality from Infectious Diseases in Manchester and Salford, from 1861 to 1870.

Year.	All Causes.	Smallpox.	Scarlatina.	Fever, including Typhus and Typhoid,	Total from four Zymotic Diseases.
1861	10,021	18	79	370	467
1862	10,195	25	235	362	622
1863	10,930	135	1,077	358	1,570
1864	10,601	90	735	348	1,173
1865	12,209	96	315	795	1,206
1866	12,094	35	345	1,023	1,403
1867	11,798	4	399	575	978
1868	12,485	15	1,290	801	2,106
1869	11,343	92	573	576	1,241
1870	11,161	77	279	300	656
Total ...	112,837	587	5,327	5,508	11,422

TABLE II.

Mortality from Infectious Diseases in England and Wales, from 1861 to 1870.

Year.	All Causes.	Smallpox.	Scarlatina.	Fever, including Typhus and Typhoid.	Total from four Zymotic Diseases.
1861	435,114	1,320	9,077	15,440	25,837
1862	436,536	1,628	14,834	18,721	35,183
1863	473,837	5,964	30,475	18,017	54,456
1864	495,531	7,634	29,700	20,106	57,440
1865	490,909	6,411	17,700	23,034	47,145
1866	500,689	3 029	11,685	21,104	35,818
1867	471,075	2,513	12,300	16,862	31,675
1868	480,622	2,052	21,912	19,701	43,665
1869	494,828	1,565	27,641	18,389	47,595
1870	515,329	2,620	32,543	12,028	47,191
Total ...	4,794,470	34,736	207,867	183,402	426,005