On Preventive Measures to be taken against Epidemic Disease.

Richard F. Blackwell
29th March 1862

[Handwritten notes: Recount the effects of Jenner's vaccine as preventives. Water])
In modern times, much attention has been paid to the important subject of Epidemics, much light has been shed by scientific investigation as to their causes and course, and the terror and alarm which accompanied the pestilences of past centuries, have, to a great extent, been dispelled. The veil of obscurity which formerly overhung these, has now been lifted away, and the light brought to bear on them has revealed to us what steps should be taken in order to prevent their spread, or to lessen their virulence.

In the oldest of books, we read of "the pestilence that walked in darkness". and in the middle ages, the terrible plagues which devastated Europe year after year, were invested with mysterious attributes. Looking on these epidemics as visitation from the hand of God, utter despair seized on all classes, and no means were taken to avert or mitigate their ravages. Thus in most instances, the sick were left unattended, and all who could
sought safety in flight. For the time, all domestic ties were broken, all moral, social feelings, disappeared, and selfishness reigned supreme.

Now, happily, all this may be said to have passed away, and in an improved state of the country and of society such results do not follow the outbreak of epidemics.

Here it may be interesting to glance for a moment at the terrible havoc committed by the plagues which swept over Europe in the 14th and subsequent centuries. Many of the old chroniclers give details of the mortality, and I have extracted the following particular as to the estimated number of deaths from a modern work, Dr. Hector's "Epidemics of the Middle Ages." It would appear that the mortality arising from them was excessive; it is conjectured that the Black Death, or Bubonic plague of the 14th century, destroyed one fourth of the population of England, and it is said that in London, with a comparatively small number of inhabitants, 100,000 persons died of it.
It is probable that at least one fourth of all the people in Europe fell victims to this malady; and assuming the entire population to have amounted then to about 105,000,000, it will be seen that upwards of 25,000,000 of human beings perished.

The Swineyling Sickness, which was prevalent in England at different periods between the years 1485 and 1557, caused a very great number of deaths. Regarding this disease, Bacon says that "it destroyed infinite persons," and Stone states that "a wonderful number died of it."

The Great Plague of London in 1665 was extremely fatal, and it was then that the authorities resorted to the method of shutting up all infected houses, isolating their inmates, and allowing neither ingress nor egress for a certain time.

It must be admitted that the mortality caused at present by epidemic disease, though infinitely smaller than it was a few hundred years ago, is still great. For instance, in the last detailed Report of the Registrar-General for Scotland, it appears that in 1856, out of 58,524 births registered in that year,
13,779, merely an exact fourth of the whole, were caused by the Zymotic, or epidemic and con- 
tagious class of diseases. Further, it has been 

stated that the annual slaughter in England and 
Wales, from preventible causes, of typhus fever, 
which attacks persons in the reform of life, is 
double the amount of what was suffered by the 
allied armies at the Battle of Waterloo.

According to the Report formerly referred to, it 
seems that the population of towns is cut off 
at a much higher rate than that of the country. 
Then, of every 10,000 persons, 132 died in the 
urban districts of Scotland, 165 in the main- 
land and rural parts, while 256 died in the 
towns. All this demonstrates the waste of 
life in our towns, and shows how much com-
mittee reform has yet to effect in order to re-
duce the mortality among their inhabitants.

When we consider the dreadful morta-
tality caused by the epidemic in the middle 
ages, this question presents itself. What was the 
condition of the country and people in those days?
Enquiring into the state of towns, and the mode of life of the populace there, we find many circumstances that would tend to favour the spread and the malignancy of the epidemics which raged so frequently.

In the 14th century, scarcely one third of England was under cultivation. Large tracts of the country remained under water for the greater part of the year, and in dry weather, they formed swamps and bogs, which were a most fruitful source of malaria and bubonic plague, and this explains the prevalence of plague in Great Britain in former times.

On examining into the conditions of the towns, such a state of matter reveals itself to us that all sanitary measures were at a very low ebb. In consequence of ever recurring rebellions and civil commotions, the towns were confined within narrow limits, and the houses were crowded together in order that they might be within the protecting city walls. Immediately outside these walls were immense stagnant ditches, which were made the receptacles of
every kind of dirt and filth. The streets were narrow and unpaved, and there was an utter neglect of all drainage, cleansing, or lighting, and there were no arrangements for the removal of the refuse of the towns. On either side of the street were gutters, into which the people threw the refuse from their houses, and in summer, as may be easily conceived, these gutters became stinking and corrupting masses of filth.

The houses themselves were mean and squalid, often without windows or chimneys; the floors were covered with reeds, which were never removed when fresh ones were added, and they thus became impregnated with every kind of decaying matter, from which the most offensive effluvia arose.

In next looking at the manner of life of the people, we find things in no better. The common people had very seldom any fresh animal food, and they had to exist throughout the entire year, almost solely on salted meat, and vegetables were almost unknown to them.
until a comparatively recent period.

Such a dieting as this would endanger a delicate state of the blood, fever prions could not very readily, and hence the people fell in great numbers when epidemics broke out.

Intemperance, also, was very wide amongst all classes, and their clothing was bad and scanty.

Such is a short sketch of the so-called "good old times," but the epithet is allowable only as a poetical figure of speech, and the most zealous admirer of the past must be forced to admit that such a state of things as the foregoing is anything but "good."

Yet these conditions cannot be said to have passed away altogether, for in London, Edinburgh, Dublin etc., in fact in nearly all our towns, masses of the people may be said to be still living in a medieval state, and it is amongst them principally, that epidemic disease now prevails, and carries off yearly large numbers of victims, and it is chiefly toward the bettering of their condition that sanitary reforms are needful.
Regarding the causes of Epidemic disease, much discussion has taken place, and very conflicting opinions have been held concerning them. All such discussions must be more or less speculative, and there can be no doubt but that the subject is a difficult and obscure one. We often find certain epidemic diseases, such as typhus and typhoid, cholera, diarrhea, dysentery, &c., prevailing in places where sanitary and other arrangements of which, are notoriously defective, and when these defects are remedied, the disease may disappear altogether, or be very much lessened.

In what follows, I shall confine myself to an enumeration of those causes which are preventable, causes which are under our own control, and which, unfortunately, are but too common everywhere.

Accordingly, I shall divide the Causes of Epidemic Disease into two classes—

the Predisposing, and the Exciting or Primary.

The first, the Predisposing, are those which
bring the body into that state, which favors the reception of the poison, whatever it be, and which render the system susceptible of the action of the Primary cause.

The second, the Primary cause, are those which excite the disease directly.

The Pre-disposing causes may be subdivided into those which are external to the organism, and those which are internal. Anything vitiating the air may be called an external cause, and anything vitiating the blood, a foul water or food, an internal cause.

Among the vitiators of the atmosphere, may be mentioned, Overcrowding, as in dwelling houses, jails, ships &c., accumulations of every kind of putrescent matter, and filth, either animal or vegetable, emanation from sewers, cesspools, stagnant water, ditches &c. Such causes as these would tend to keep the disease prevalent in one particular locality or portion of a town.

Among the internal causes, those which vitiate the blood, are foul or putrescent matter in
roduced into the body either as food or
drink, bad or imperfect diet generally, and
insufficient action of the different secretory or-
gans, thus causing an impure state of the
blood, by the accumulation within it, of ma-
terials which have become unfit, and should
accordingly have been thrown out.
Looking at the first class in particular, the
vitiating of the air, it will at once be ap-
parent, how many, if not all of them, are capa-
able of being removed, or prevented from exer-
cising a deleterious influence on the public
health, and tending to favour the spread of
epidemic disease. These causes are all
palpable and definite, and as I have before
said, capable of removal. For instance, the
accumulation of filth, and of all decaying and
putrefying matter, may easily be prevented
by providing an efficient system of draining
and cleansing, and again we can prevent
overcrowding by erecting suitable dwelling
houses, factories, schools, &c.

Of the second class, the vitiation of the blood,
the supply of wholesome and abundant food
and water, is also under our own control.

Much attention has been already
given to these preventive measures, in some places
more than in others, a great deal has yet
to be accomplished. Of course a long pe-
riod must necessarily elapse before such meas-
ures can be thoroughly carried out, and much op-
position has been, and doubtless, will, be offered
to them, but if the matter were taken up in
real earnest by the government and by the
people, a great change for the better would
eventually be made throughout the country, and
many lives be saved annually.

The beneficial results which accrue to the pub-
lic health, are very evident in those towns, in
which proper attention has been paid to sanitary meas-
ures. Liverpool presents a notable example
of this, and I shall have occasion to refer
to it hereafter.
Among the nations of antiquity, the subject of public health was one which great attention was paid, and it appears that sanitary measures were efficiently carried out, and rigidly enforced. The Jewish Law affords an example of this, and we find in it the most precise and minute regulation as to personal cleanliness, the state of the camp, proper food &c. The Greek and Roman laws were not unmindful of these matters; the Cloaca maxima of Rome still exists, and everything shows that they took the utmost pains to have the drains, and the supply of water in their cities, as ample, as could be.

In the middle ages, however, sanitary precaution fell into disuse; during the enactments turned at this time, the people were almost entirely neglected; there was a great want of cleanliness, and consequently, as we have seen, the mortality was at a premium.

Public Health was much neglected in this country until a comparatively recent period.
By the discovery of Vaccination by Dr. Jenner at the close of last century, a great advance was made in regard to the prevention of that terrible scourge, Smallpox. Nor, Cholera visited Great Britain, and since its first outbreak in 1831, a great deal of attention has been directed to sanitary reform. The labours of the Health of Towns Commission threw much light on the subject, and have been the means of effecting many improvements; still, it is not too evident that much remains yet to be done in the way of preventing disease, and lessening the mortality of the country.

I shall now proceed to speak briefly of various measures to be taken with regard to epidemic diseases, in order either to prevent their recurrence, or, if they do break out, to lessen their severity. And these measures are more strictly applicable to our great towns, where large numbers of persons are congregated together, and where chiefly, epidemic disease prevails.

And in the first place, I shall make some
remark, regarding the important subject of Water, more especially as to supply, purity. An ample supply of pure and wholesome water is absolutely necessary for the preservation of the health of communities. The evils which result from a want of the most essential element are endless: unless there is plenty of pure water, there cannot be pure air. Again, when houses are not supplied with it, as a matter of course, there can be no water-closets, soil-pipes or drain, and then necessarily, there must be pure filth and equal or noxious effluvia, and in short, all these conditions that would tend to generate disease. Then, when the supply of water is insufficient, there are many evil consequences — there may be drain, soil-pipes &c. but from the want of proper supply, they come to produce those very results which they were intended to prevent — they become stagnant receptacles of every kind of filth and matter, are even worse than if there had been no drain at all.

So far as regards many portions of the Old Town.
of Edinburgh, the water supply is very defective. From there is no scarcity in the amount supplied to the city itself, but in an immense number of instances, no means have been taken to afford the inhabitants of the poorer parts, ready access to it, and it is calculated that there are no less than 41,000 of the population of Edinburgh, to whom an abundant and accessible supply of water is utterly unknown. The houses inhabited by these people are in exactly the same condition that they were 200 years ago. The people are dependent, for their supply of water, on public wells, which are often at a considerable distance from their homes, and hence they are either unwilling or unable to take the trouble of getting a good supply, and accordingly they themselves and their houses remain in a condition dangerous to the public health.

Of course where there is no water, there can be nothing but filth and degradation among such a mass of people, and under such circumstances, drain can be only of minor importance, except for carrying off rain.
water. The horrid state of many of the Edinburgh wells, affords another example of the evils resulting from an imperfect supply of water.

Next, many dangers are incurred by the use of impure water. Impure water is very possibly the cause of certain endemic diseases, such as yellow and remittent fever. Then it is of importance to look at the evils which are caused by the use of water contaminated by organic matter, and in connection with this, we find that the nearer the source of the water supply are to human habitation, the greater will be the danger of its being impure.

Water is often contaminated by the refuse arising from sewers and house drains, and this is especially the case in large towns which lie low. This certainly ought not to occur in Edinburgh, in account of the situation of the city, as it is placed pretty high, and consequently there is an abundant declivity, and every facility for the escape of matter from the sewer. The water may be contaminated in many ways —
as by leakage into the soutield from imperfect drainage, or from one portion of a town being placed lower than other parts, or when it drains empty themselves into rivers whence the people get their supply of water, or it may be rendered impure from cesspools, &c.

Epidemics have, in many instances, been traced to impure water having been used. Thus, in Bedford in 1859, an epidemic of typhoid fever was clearly traced to the contamination of the water which the inhabitants had been in the habit of drinking. In this town, it appears that cesspools are exceedingly common, and they are so constructed that the matter in them rapidly sinks into the surrounding soil, and most of the public wells are in close proximity to these cesspools.

Cholera, again, is often very severe in those localities where the water supplied is notorious by impure. The late Dr. Snow gives many examples of this, and he maintained that Cholera was a disease arising from impurity in the water supply. I select one or two
example. Dumfries, in the year 1832 and 1848, suffered very severely from cholera, and in this town, the water supply then was very impure and scanty: after this pure and more abundant water was obtained, and in the epidemic of 1834, Dumfries scarcely suffered at all.

Again in Hull in 1832, the supply of water was scanty but pure, and the deaths from cholera amounted to 300. In 1844, water was brought in from the river, probably much contaminated, and in the epidemic of 1848, the deaths were nearly 1900.

As a further example of the necessity of having pure water take the case of Southwark. It is supplied by two water companies, the Southwark and Vauxhall, and the Lambeth Water Company; the water supplied by the latter is much better than that of the former, and it was found that cholera was not nearly so severe in the district which the Lambeth Co. supplied. Mr. Simon, in his Report to the Board of Health on the effect of the consumption of pure water.
in cholera, state that "the population drinking dirty water appears to have suffered 3½ times as much mortality as the population drinking other water."

Cholera, diarrhoea, dysentery, typhoid fever etc. may be due in many instances to the contamination of the water we drink, and all the foregoing facts point to the great importance of not only having an ample, but also a pure supply of water. Water is just as free to us as the air we breathe, it is not the exclusive property of any particular individual, and therefore no one has the right of withholding it from his neighbours. If there be not plenty of pure water, filth and excrement must necessarily prevail, and noxious emanations pollute the atmosphere in every village, and all the condition favouring the origin and spread of epidemic must flourish. Accordingly, I would insist on the necessity of having a copious supply of good water everywhere provided, and I would give it the foremost place among the preventive measures which ought to be taken against epidemic disease.
In connection with the subject of water, the question of Drainage and Sewerage, naturally presents itself. The proper drainage of every town, village and dwelling is a matter of the utmost importance to the health of the people. Everything demands that it should be as thorough as possible, yet it is lamentably deficient in many places, and in some localities, it may be said to be altogether wanting. The evils resulting from imperfect drainage are very manifest, and it is impossible to expect that the health of persons, exposed to deleterious emanations from badly constructed drains and drains, can be satisfactory.

It is absolutely necessary that all refuse should be immediately put away from us, and to effect this, the drainage and sewerage must be such as to ensure the immediate removal of all waste matter. Formerly, most of the garbage and filth was removed by manual labor, and this primitive method still prevails to a certain extent. The first drains made were not adapted for carrying away the refuse of the houses; they were used for removing rain water & from the streets.
In regard to the common severs, it is often found that they are constructed in such a manner, that instead of being a means of removing filth and refuse, they conduct to the accumulation of such matter, and hence become a fertile source of disease, generating fever poison. This poison generated by the matter within them becoming stifaced, is diffused by the effluvia escaping by the full holes, or getting into dwelling by means of the house drains. When these full holes open opposite houses, it is noticed that fever is common in such localities. The late Dr. Southwood Smith, in his evidence before the Health of Towns Commission, observes, that when fever once attacks any one member of a family living in such a situation, it commonly attacks several, and the disease itself is severe, and that persons living in the lower rooms of houses thus situated, are apt to be attacked by fever.

Many severs, when badly constructed, become gigantic cesspools, with the disadvantage that they are concealed from view; cesspools themselves can be emptied when they become too
full, but in most instances, this cannot be
done to the sewers. Then by the accumula-
tion of filth in the main sewer, the house drainages may
be secondarily involved, the mouths of the lat-
ter are stopped up, and there is a reflex of
the noxious gases from the matter collected in
the drains into the houses, and thus these
drains instead of conferring benefits on the inhabitants,
become very injurious.

Formerly, the sewers were almost universally built
of smooth box form, and matter was often to accumulate in them. Further, the supply
of water in such sewers is generally very de-
fective, and quite inadequate to wash away
the solid refuse; the water merely trickles
over the lower part of the drain, instead
of rushing through them in a full stream.

In order to do away with these imperfections,
the sewer should be made in a box conduit
and not becaneous, and to effect this, it
has been found that a cylindrical form of
drain is the best, a much less powerful stream
of water being required for them.
Then, no drain is efficient, unless the supply of water be ample, and when a continuous and copious stream of it is not available, the sewer ought to be frequently flushed.

Next, all drains and sewers should be thoroughly impervious, otherwise they will leak and diffuse noxious matter into the soil, both above and below them, and in this way the drinking water may be rendered impure and harmful. To prevent such an occurrence, their interior might be composed of glazed earthenware, or some such material, and this would effectually prevent the escape of their contents.

All drain and sewer should also have a sufficient fall or declivity in order to ensure the ready removal of the matter within them.

All cesspools too, should be abolished, as they are merely receptacles of filth, and may be productive of very evil consequences.

Even where the street drainage is good, the house drains are often inefficient. Their connection with the main drain may be defective, and the pipes from the water-closets are often...
quite useless, from scanty supply of water for
instance; the effect of such a state of things
is seen in those cases in which fever has
long infected one particular house or locality
where such condition, exist.
When we consider how numerous and manifest
are the evils which result from imperfect drain-
age and sewerage, and how imminent to health,
decaying and offce matter are, it is strange
that such apathy has been shown regarding
their removal. Until lately, in very many town
drainage may be said to have been almost al-
together wanting, or at least very imperfect,
and consequently much injury was done to health,
and great mortality was caused in these places.
Now, much attention is being paid to this im-
portant subject, and it is to be hoped that
erelong, a complete system of drainage will
everywhere be established, and this of course
involves the necessity of a thorough supply of
water also. These condition, once established,
the good effects resulting therefrom, would
soon make themselves apparent.
I shall next say a few words on the subject of Ventilation and Overcrowding.

And first as to ventilation. No one will deny the necessity and importance of plenty of fresh air, yet, in numberless instances, it would seem to be systematically excluded. This is seen in dwelling houses, schools, workshops, hospitals, etc., and in these places where fresh air should most abound, how often is it absent.

Contaminated air is well known to be very productive of epidemic and other diseases, and in order to prevent their outbreak, everything calls for good ventilation. Every means should be taken to prevent stagnation of the air; if it be allowed to stagnate, fever, for instance, is very likely to spread, but if it be kept in a state of motion, if free ventilation is established, there is much less danger of the malady increasing.

It is surprising what an amount of ignorance prevails concerning this important matter of ventilation. The lower classes, in many instances, seem to have an utter aversion to any fresh air gaining access to them, and their houses in this state, are
without ventilation, are worse than the huts of savages; such houses exist in great number, in our town, and they really merit the name of "fever nests." Dr. McCulloch, in his account of the Hebrides, remarks that while the inhabitants dwelt in houses of the most simple construction, which afforded ready access and exposure to the fresh air, they were not subject to fevers, but when provided with habitations seemingly more comfortable and commodious, but which afforded recesses for stagnating air and impurities, febrile infection was generated.

In the greater portion of the houses of the poor, we see that the windows, open only from below, and this tends to favour the retention of the impure air. To remedy this, the ventilating apparatus should be placed up near the roof of the room, in order to allow the hot air and impurities which rise to the ceiling, to escape. Dr. Neil Arnott relates that when visiting Glasgow along with Mr. Chadwick, he saw the best lodging house in connection with a manufactory there, in which fever constantly prevailed,
but by making an opening from the top of each room through a channel of communication to an air pump, common to all the channels, the disease disappeared altogether.

But the necessity for fresh air and ventilation is so manifestly obvious, and the many injurious effects of impure air so apparent, that it is needless to say much under this head. The great difficulty is how to establish complete ventilation in the old and confined houses, into which large numbers of the working classes are packed.

The great cause of the irritation of the air is overcrowding, and I shall next make some remarks on it. Overcrowding is a fertile source of epidemic disease, and it is one of the most common predisposing causes. It is one of the most evil evils of all the large towns, and it prevails also, though to a less extent, in many rural districts and villages. In Scotland, it is very common in the agricultural districts, a common in the way in which farm hands are crammed into the "boothies". Here, it is far more irremovable than in the town, for in
the country, want of sufficient space for building purposes, cannot be the excuse for such a state of matter.

The evils caused by overcrowding are very well set forth by Dr. Duncan of Liverpool, in his evidence before the Health of Towns Commission. He states that in 1842, it was calculated that more than one half of the labouring population of Liverpool, was living in cellars and other unwholesome habitations, in swarms exceeding 8 or 10 times the number of persons who should be allowed to occupy such a space. Dr. Duncan states that the Inspector of Prisons for England recommend 1000 cubic feet of air, as being essential to each prisoner, for the purposes of health and ventilation, yet in these Liverpool cellars, each inmate had not more than 70 cubic feet. Under such a state of thing, the terrible mortality caused yearly in Liverpool, was little to be wondered at.

The same thing exists, though to a less degree in Edinburgh: it is notorious in many parts of the town, in account of the manner in which
the houses are "crisped, cabin, and confined." The proportion of inmates to each room being far beyond what it should be. It is estimated that the number of quarts of air each inhabitant in the Old Town of Edinburgh, is only from 72 to 140, while in the New Town, it ranges from 330 to 360 (Dr. Stark). The stench and closeness of these crowded rooms in the close of the High Street, Courtauld is, is quite inapplicable. The persons living in them are very apt to be attacked by epidemic diseases, in a severe form, and their convalescence is certain to be tardy.

During the epidemics of Cholera in St. Britain, the evils of overcrowding were well exemplified in the following instances. At Tooting, in an establishment for pauper children, there were 1395 inmates, little more than 100 cubic feet of breathing space being allowed for each child; in one night Cholera attacked 64 of them, it then spread, and 300 in all were seized by it, of these the large number of 186 died.

Again at Taunton, in the workhouse there were 276 inmates. In some of the rooms, the breathing
space was not more than 64 cub. ft. per person. Cholera swept away 60 of these people in less than a week. While in the neighboring county jail, where the breathing space allowed each prisoner, ranged from 819 to 935 feet, neither cholera nor diarrhea appeared. The people living in the town itself, were also unaffected by the epidemic.

Again at East Farleigh, near Maidstone, 1500 persons were assembled for hop picking. They were lodged in shears, and had only 80 sq. ft. each for breathing space. In a few days, diarrhea became universal. 97 were attacked by cholera, and of these 46 died. In the same village, a person employing a similar number of people, provided proper accommodation for them, and there was a complete immunity from the epidemic among the labourers.

We can also see the evil effects of overcrowding in beleaguered cities, typhus often causing more harm among the defenders than all the assaults of the enemy.

But the bad consequences of overcrowding are not
confined to man alone, for we often see them in the lower animals. Thus, typhus prevents among horses, when they are overcrowded; distemper kills dogs in overcrowded kennels; and it is known that sheep overcrowded in ships die of typhoid disease.

In consequence of the overcrowding of the prisons last century, large numbers of the prisoners were carried off yearly by the Jail Fever.

When we consider the horrid state in which the atmosphere must be in small rooms packed full of people, can we wonder at the generation of typhus in ordinary seasons? And can we wonder at the house it will cause in what may be termed an epidemic season?

Thus, then, the evils of overcrowding are also very manifest, and to do away with it, must be one of our principal duties in considering what preventive measures we should take against epidemic diseases. And to effect this, there must be better provision for the better construction of the homes of the working classes. This question is at present
engaging much of the attention of the public, and
Association, whose object is to provide better
house accommodation for the lower orders, are
now being formed. But the carrying out of
such a project is necessarily beset by many
great difficulties; the opposition of landlords, and
the prejudice of the people, whose condition is
thought to be improved, must both be overcome
before any good can be effected. A large
and densely inhabited portion of a great city
cannot be transformed from a state totally
unsuited for human beings into a greatly improved
condition, without suffering and inconvenience
during the process of transition. However, with
determination on the part of the public, and patience
on the part of those who will be presently incon-
venienced, but ultimately benefited, every diffi-
culty will be surmounted. Wise provision should
be made in all our cities and towns, for
the working classes, an immense amount of good
would, in every way, be brought about.

It is very apparent that a large number of
houses in our old Town are quite unfit to be
the abodes of human beings, and the wretched state of such places is but too well known to all who have engaged in Dispensary practice. These old houses look very picturesque at a distance, and they are doubtless extremely interesting to the antiquary, but they do not stand the test of near inspection, and for the purposes of health, the sooner they are dispensed with the better.

Model Dwelling have been established in many places, and the results obtained from them are very encouraging. In speaking of them, the Late Dr. Southwood Smith says the following arrangements should be carried out:—

"The essential drainage of the site of the building;"
"The free admission of light and air to each room;"
"The abolition of the cess-pool, involving complete house drainage, an abundant supply of water, and the immediate removal by it of all refuse which it is capable of holding in solution;"
"Means for the removal of house refuse, not capable of suspension in water."

Now these arrangements are very simple, and only
in accordance with the dictates of common sense, and the first principles of hygiene, yet how seldom do we find them acting, and a state of things exactly the reverse prevailing.

Speaking of the results of these arrangements, Mr. Smith states, and he proves it by statistics, that the mortality among the inhabitants of these dwelling, is one-half less than that of London generally, and three times less than that of some of the filthiest and neglected localities of the metropolis, and further that the infantile mortality is also greatly lessened. He says further that there has not been a single death from typhus, or any other form of continued fever, among the adults of these dwelling since their establishment, and moreover that they were singularly exempt from cholera during its visitation. He calculates that were the whole of the metropolis as healthy as these Model Dwelling, there would be an annual saving in London of 23,000 lives.

Model Dwelling also exist in some parts of Edinburgh, but as far as I am aware, no statements have yet been published, regarding the health of
Looking at the encouraging results of improved house accommodation, I would advocate the establishment and general adoption of such dwelling, as the above mentioned, as a very important measure in the prevention of epidemic disease. But of course a very long time must elapse before such improved dwelling could become general, and in the meantime, the existing evils in house accommodation must be remedied as far as possible. Thus the choosy should be opened up in order to admit more light and air, water and soil pipes, and water-closets ought to be introduced into those houses, where such things are still unknown, and the drainage and sewage generally must be improved. Some such palliative measures as the above, would undoubtedly improve somewhat the health of the people, but still I think, medical treatment would be preferable, and this would be best accomplished, as regards the subject of dwelling, by the adoption of such a I have formerly spoken of.
A very objectionable practice, more common formerly than now, is the Interment of the dead in Towns. Mr. Chadwick paid special attention to this matter, as will be seen from his elaborate Report.

All interments in Towns, when the bodies decompose, tend to augment the mass of atmospheric impurities, and they thus prove injurious to the public health. Mr. Chadwick in his book, quotes from Dr. Recke of Stuttgart, who in his Report on the "Influence of putrefactive emanation on the health of man", states that the emanations from bodies interred in Towns, if the effects be often repeated, cause low fever, or communicate to them fever, a typhoid character.

At all events, this practice is one which it is clearly wrong to allow to take place in the midst of crowded cities. The practice is prohibited in many foreign countries, and even barbarous tribes teach us a lesson in this matter, for among them, the dead are almost always buried at a distance from the villages.

The evils caused by intramural interments are now abated by the establishment of cemeteries outside
Our town, and one prolific source of putrid emanation, is thus removed.

Further, measures should be taken, where the drainage and sewerage is not very good, to prevent the accumulation of all kinds of filth. Such accumulation will contaminate the atmosphere, and though not actually producing disease, yet they will render the constitution liable to be seized by whatever form of epidemic happens to be prevalent at the time.

Public Slaughter Houses in town ought to be abolished, and removed to some distance outside. In Paris, in 1810, in consequence of the evils resulting from slaughter houses, public abattoirs were established. These slaughter houses, especially if in confined localities, seem to be very injurious, the poison generated by them being very virulent.

Means should also be adopted for the exclusion from the neighborhood of houses dwelling of filth creating animals, and of all noxious trades, seeing they all engender atmosphere impurities.
Lazaretto and Quarantine Establishments
an ancient origin, and have long been employed
as a means of preventing the importation of disease
into one country from another.
Professor Traill mentions, that though the Plague
has frequently appeared in different parts of Eu-
rope during the present century, Britain has en-
joyed a complete immunity from it, nor quar-
antine laws having been strictly enforced during
its prevalence.
Quarantine seems to have failed, however, in check-
ing the progress of Cholera, but its efficacy
in checking the plague seems pretty well estab-
lished.

A remarkable relation would seem to ex-
ist between Epidemic Disease and the Diet of the
people. A morbid state of the blood, induced
by scanty and unwholesome food, will highly pre-
dispose to the action of poisons. The great
mortality caused by the epidemic of the middle
days may then be partly accounted for. As I
formerly mentioned, the people then had very
little variation in their diet; it consisted primarily of salted meat, vegetables being almost unknown. In addition, we read that famines were of frequent occurrence. These circumstances all tended to produce a fatal issue, when epidemics prevailed.

If famine prevailed in a country, pestilential disease is very apt to appear also. This was seen in the case of the Irish Famine of 1847, when typhus fever raged, and more recently it has been observed in the North West province of India, where Cholera carried off large numbers after the famine had occurred.

Professor Bennett thinks that Typhoid fever is often due to a particular diet, for it was very prevalent among the Irish who came to Edinburgh in 1847–48, just at the time of the Potato disease in Ireland. Typhoid fever is also common among the French and Rhineland peasants and their diet is known to be poor and scanty. Other circumstances taken into account, diet, climate, has much to do with the particular form which the fever takes.
Accordingly, regulation of the diet, may be considered, as to a certain extent, preventive of epidemic disease. Of course, the adoption of a good diet by the lower classes must depend very much on the general prosperity of the country at large, and further, the prevention of famine is a matter which is but little under the control of man.

And lastly, I shall say a few words regarding Vaccination. By means of the great discovery of Vaccination by Dr. Jenner at the close of last century, the power is imparted to us of checking almost entirely what was formerly one of the greatest scourges of this and other countries—Small Pox.

From the old Bills of Mortality, we see what terrible ravages were committed by it, but happily, it holds a subordinate place now in the Register General's Report. As an example of this, it appears that in 1760 out of every 1000 deaths, 100 were caused by Small Pox, whereas in 1850, only 16 deaths per 1000 were due to it.
However, it must be confessed that in Great Britain, the practice of vaccination is still far too much neglected, and there are yet many deaths, owing to its not being effectively carried out. The mortality in continental countries from smallpox is very much smaller than it is in our own, and this is mainly due to the absolute authority exercised over them people by the foreign governments, with regard to vaccination.

In Scotland, no compulsory vaccination Act exists, though there is one in England, but even in the latter country, in spite of the Act, the practice cannot be said to be compulsory, as there are no proper offices to enforce its performance. But in Great Britain, any display of absolute authority or power is always distasteful to the people, and such an Act in Scotland, as the above mentioned one, would probably cause very little improvement, if any at all, in the matter.

In Scotland, the parish boards take the subject into their own hands, appointing medical
officers to perform vaccination, but number of the lower classes are either unaware of the fact, or are actually adverse to the proceeding, and how many children are never vaccinated.

I think it would be better therefore, if medical officers were appointed, say by the different boards, to make a thorough visitation of their particular districts at frequent and stated periods, for the purpose of performing vaccination wherever it was necessary to do so. This plan would be preferable to driving the people "vi et armis" as it were, to the dispensaries and other places, in order that they should be vaccinated.
When we consider generally the subject of Epidemic, several facts strike us with regard to them.

In the first place we see that Providence has not allotted them as necessary to man's existence on earth. They are not what may be called necessary evils; for we perceive secondly, that they are very much under man's control: thus, by taking the proper precautions, we can prevent their spread, and in the contrary, if men should blindly persist in enunciating a state of matter, diametrically opposed to the known laws of health, we can promote their spread and fatality. We can secure ourselves from them, and several forms of epidemic disease, formerly so prevalent, have now disappeared.

Thirdly, in comparing the diseases and the mortality of past times with the present, it must be apparent to all that a wonderful change for the better has taken place, notwithstanding the constant neglect of sanitary measures, everywhere so common. In consequence of the improved condition of the country and the people,
the terrible pestilence of the middle ages, has now ceased to visit us; still the truth is that epidemic diseases are but too common amongst us yet, and this is chiefly to be explained by the fact that large masses of our population have advanced but little in civilization. Though the nation generally have rapidly advanced in every way, they have remained stationary; they are living in a medieval state. The condition are similar, and we see the results are similar.

Fourthly, in looking at the forms of disease, common so late as the last century, we find that many of them have almost disappeared, or have been greatly lessened. For instance, Small Pox, once so prevalent, is, or rather should be, but little met with now. Also, the Sack Fever, and the Fever so common in our hospitals, ships, schools &c., may be said to have gone; intermittent fever is now extremely rare; and dysentery also is not nearly so common as formerly. Typhus Fever does not at all correspond with images as it used to do, and
of various other diseases; yet epidemic however, the same may be said.

All these facts should stimulate us in our endeavor to improve the state of our cities and towns, and to remove or modify the most alarming evils. And in order to produce satisfactory results, such reform must be thorough; it will not do for them to be partial. It will not suffice, for example, to provide better drainage or sewerage, and still tolerate overcrowded and badly ventilated homes: if possible, all must be remedied together.

To recapitulate, improved dwelling for the poor ought to be constructed, the drainage and sewerage, both public and private, made efficient, the water-supply made pure and ample, overcrowding prevented, all nuisances and noxious trades removed from amongst us, and vaccination made general, while in addition, Health Officers should be appointed to see to the carrying out of all necessary sanitary reforms. Were all this accomplished, we might reasonably hope that the worst forms of epi-
domestic disease would first be lessened, and after a time perhaps, cease to disappear.

It is needless to dwell at length on the necessity for Sanitary Reform; the fact that it is required is very evident to all, and we are further called on to take immediate steps in the matter. The beneficial results of Sanitary Reform, when it is taken up in earnest by the community, are undeniable. Liverpool may be adduced as a good example of the effect of such reforms, for since 1846, when the municipal authorities amended the worst features of their sanitary condition, it has been estimated that an annual saving of from 3500 to 4000 lives has been made.

But then, considering the generally unhealthy and diseased condition of our towns, the important question arises, How are all these reforms to be accomplished? And it is not easy to answer it satisfactorily, as many and great are the difficulties and obstacles which prevent themselves. First, it is to be observed that there is a remarkable apathy among all classes,
concerning the matter. This is partly owing to the great ignorance which so commonly prevails regarding the simplest laws of health; hence the importance that there is for teaching in all our schools and seminaries, the fundamental principles of physiology, in order that the people may know what are the laws of health, that they may be shown the danger they incur by violating them, and that their interest may be aroused with regard to this important subject.

Again another difficulty arises, namely, who are to take the initiative in Sanitary Reform. This is certainly a question vexata, for some would leave the matter to be dealt with by private individuals, others to the local municipal authorities, whilst others advocate the plan of the government executing all the necessary reforms. There different views are steadfastly upheld by the different parties, none will yield to the other, and the upshot of the whole is, that nothing is accomplished. While the municipal authorities are entrusted with the direction of sanitary reforms, in the
great majority of instances, no food is effected, and this is especially the case in Edinburgh. The Rev. Charles Kingsley spoke of sanitary legislation proving inefficient because it had "left the execution of the law too exclusively in the hands of local authorities," and he attributed that inefficiency mainly to these "local authorities having a direct pecuniary interest against anything being done to diminish the money value of houses unfit for human habitation," many of them being "directly interested in the preservation of the very nuisances they are bound to suppress."

If these municipal authorities have been tried and found wanting, the question comes, "Who should the Imperial Government intervene? Of course, such a proposition were advanced here, a great clamour and outcry would be raised by all interested parties, and the interference of the Government would doubtless be denounced as unconstitutional, tyrannical. But surely when the lives of so many hundreds of our fellow creatures are at stake, any mode of proceeding which would lessen the mortality, ..."
and improve the sanitary condition of our towns, would be favorably received by all unprejudiced persons; anything would be preferable to the present state of matters.

In so far as regards Scotland, all modes of sanitary reform, in whatever way effected, must prove comparatively cheap, unless the important step be taken of appointing Health Officers, such as we find in London, Liverpool, and other great towns in England. These officers must be medical men, and it will be their duty to spy into all houses, enforce the law rigorously against such, and to make periodic statements to the authorities; a thorough house to house inspection, frequently made, would form one of their most important duties, for without such local inspection many cases could not necessarily escape notice. The appointment of such officers in all our towns, would I am sure, be productive of the very best results.

Sanitary Reform always seems to come up epidemically as it were, after a visitation of
A cholera is, the country becomes frightened, but in a short time the fear passes off, all recovers into their former apathy, and nothing is done. It is now a quarter of a century since England was visited by Chadwick, J. Snow, and Smith, and others, to a sense of the fatal defect in a legal organization, which had no system of sanitary precautions, and accordingly the supervision of public health in England has been a department of government for 14 years. Under the Public Health Act, there are at present about 200 towns, but in about 50 of these however, nothing has yet been done in effecting sanitary reform. I have ascertained that in 1849, a bill was introduced to extend the supervision of the Public Health by government, to Scotland, but that great opposition was made to it, and it came to an end. In 1855, a similar bill was introduced, but it also was thrown out.

As I have previously mentioned, the entire subject of sanitary reform is now attracting
great attention in this city, and indeed, throughout Scotland generally. A General
Police Bill for the sanitary improvement and
regeneration of towns in Scotland, has been in-
troduced; however, that bill has yet to become
law, but all who wish to see reform effected
must hope that it will be successful.

Finally, all must acknowledge that sanitary
reform are loudly called for, the annual
waste of life in Great Britain, due to neglect
of them, being disgraceful to any country, call-
ing itself a Christian one.

Let then the subject be constantly agitated, let
all labour unceasingly, till some great and
deep reform are introduced, and once commenced,
let all proceed steadily forward, in the good
work, adopting in their motto, the word
"Vestigia nulla retrorsum."

Richard J. Blackwell
29th March 1862.
Appendix

No. I. Comparative Vital Statistics (Dr. S. Smith)

<table>
<thead>
<tr>
<th>Locality</th>
<th>Period</th>
<th>Average Population</th>
<th>Average Mortality</th>
<th>Average Proportion</th>
<th>Deaths of Small Pox, 1850, Per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan Building, (Old Pancras Road)</td>
<td>during 5 years</td>
<td>649</td>
<td>9</td>
<td>13.9</td>
<td></td>
</tr>
<tr>
<td>London (same 5 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24.1</td>
</tr>
<tr>
<td>All the Metropolitan Associaton Buildings</td>
<td>during 3 years</td>
<td>1426</td>
<td>18</td>
<td>12.6</td>
<td></td>
</tr>
<tr>
<td>London (same 3 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25.4</td>
</tr>
<tr>
<td>The Potteries, Kentish Town, one year (1852)</td>
<td></td>
<td>1263</td>
<td>51</td>
<td>40.0</td>
<td></td>
</tr>
<tr>
<td>Metropolitan Building, (Cholera Year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12.9</td>
</tr>
<tr>
<td>London, 1852 (same year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29.4</td>
</tr>
</tbody>
</table>

Children under ten years of age

<table>
<thead>
<tr>
<th>Locality</th>
<th>Period</th>
<th>Average Population</th>
<th>Average Mortality</th>
<th>Average Proportion</th>
<th>Deaths of Small Pox, 1850, Per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan Building,</td>
<td>during 3 years</td>
<td>408</td>
<td>11</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>London, one year (1852)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Potteries (same year)</td>
<td></td>
<td>384</td>
<td>42</td>
<td>109</td>
<td></td>
</tr>
</tbody>
</table>

* The proportion of the Metropolitan Building that year was only 10.

No. II. Decrease of the Mortality from Small Pox

The following tables were compiled by a committee of the Epidemiological Society to show the gradual diminution in the mortality from Small-pox in
in London, as compared with the mortality from all causes, since vaccination has been introduced, notwithstanding its misuse in imperfect employment.

1. Table showing the average of deaths from Small-pox over 1000 deaths from all causes within the Bills of Mortality during the last half of last century — the half-century preceding vaccination.

   For the 10 years ending 1760 ... 100
   1770 ... 108
   1780 ... 98
   1790 ... 87
   1800 ... 85

2. Table showing the same during the first half of the present century — the half-century preceding the introduction of vaccination.

   For the 10 years ending 1810 ... 64
   1820 ... 42
   1830 ... 32
   1840 ... 23
   1850 ... 16

   (From Dr. Watson's Practice of Physic, Vol. II)

No. III. **Gradual Decrease of the Mortality generally.**

In 1700, the estimated mortality of England and Wales was 1 in 39; in 1750, it was 1 in 40; in 1801, it was 1 in 44; in 1810, it was 1 in 49; in 1820, it was 1 in 55; and in 1830, it was 1 in 58.

In London, in 1700, the death rate was 1 in 25;
in 1750, 1 in 21; in 1801, 1 in 35; in 1810, 1 in 38; and in 1830, 1 in 45.

The estimated mortality of persons under twenty
year of age in London in 1780, was 1 in 76; in 1801, it was 1 in 96; in 1830, it was 1 in 124; and in 1833, it was only 1 in 137.