Sanitary reform : a lecture delivered at the Institution Room, St. Ives, on Tuesday, Nov. 20, 1860 / by Lord Robert Montagu.

SANITARY REFORM.

(9)

A LECTURE

DELIVERED AT

THE INSTITUTION ROOM, ST. IVES,

ON

TUESDAY, NOV. 20, 1860,

BY

LORD ROBERT MONTAGU, M.P.

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SANITARY REFORM.

On Tuesday evening, the 20th of November, Lord Robert Montagu, M.P., delivered a lecture on "Sanitary Reform," at the Institution-room, St. Ives, Huntingdonshire, before the members of the "Young Men's Christian Association" and their friends. The VICAR was in the chair.

His Lordship rose and said—

I once heard a definition which, at the time, amused me very much; but which, on mature reflection, seemed replete with wisdom. It was said that Dirt is nothing but a good thing in the wrong place. Now I hope to show you to-night that this needless misplacement of a certain substance not only sweeps off our populations, but deteriorates our land; although the same substance, in its proper place, is of the greatest consequence and value. Sanitary Reformers are right in saying that unless you remove from them this misplaced substance, life will be abridged; while Agricultural authorities aver that unless you transfer this same substance to them, their fields will become impoverished, and the population will starve. The towns say: "take it from us or we die!" The country says: "give it to us or we perish!"

In proving this I hope to unfold to you laws which have for years been placed before you in holy writ; and of which we are told that "not a jot nor a tittle shall pass away until all be fulfilled."

It is a large subject. I cannot hope to do it justice. I can only give you hints which you must expand for yourselves by thought and study. Would that there were some Muse presiding over this subject, whom, after the fashion of old poets, I might call in to my aid! But instead of invoking a muse, as there is none, I must content myself with merely express-

ing a desire in the words of Sir John Denham on the River Thames:

> "Oh, could I flow like thee, and make thy stream
> My great example as it is my theme!
> Though deep, yet clear; though gentle, yet not dull;
> Strong without rage; without o'erflowing, full."

These words shall be my only invocation. Words which, although true at the time they were written, are strangely inapplicable to the Thames of our days.

I must also appeal to you, ladies; and implore you not to exact of me any false modesty, while addressing you on this subject. Do not, I pray you, ask me to make a childish sacrifice of great truths for the sake of nice words. This is indeed an ungainly and unamusing subject for a lecture. I chose it rather than a more brilliant topic, because of its unspeakable importance in regard to your welfare.

I am going to begin by asserting a pleasant doctrine, however; and will then prove it by facts and arguments of not quite so poetical a nature. That doctrine is this: that Death by old age is the only normal kind of death; and that it is as natural to attain to death at the age of three score years and ten, as it is natural to pass from youth to manhood at one score years and one.

In the Faro islands, with a population of about 8,000, it appears that the period for death by old age is from the 80th to the 90th year; for, according to Dr. Panum, *many more deaths happen within that decennium of age than within any other decennium after the completion of the first year of life.*—Virchow's Archiv. I. 493.

Now little more than a tenth part of the deaths of England happen at 75 years and upwards. And thus, physiologically speaking, one may say that at least nine-tenths of the entire mortality occurs more or less prematurely.—(Papers on the Sanitary State of the People of England, 1858.)

The Registrar General has for some time stated, in his Reports, that one fourth of the deaths of England and Wales are of artificial production: and that 5000 or 6000 deaths are premature, and might be avoided. And as there are, on an average, 30 cases of sickness for every death, it appears that 1½ million of cases of sickness might be avoided by observing the laws of health.

There are 628 Registration districts. Of these 64, (containing about 1 million of inhabitants) have a death-rate of 150 to 170 per 10,000 souls. The average death-rate is 220 per 10,000 souls. In the worst town district the death-rate is 360.

Now in 1857, there died 420,019 persons. So that if the death-rate all over England had been no more than it was in the

64 best districts, 91,856 lives would have been spared in that one year.

TABLE.

1. Annual death-rates, by diseases which are either wholly or almost wholly preventable under good sanitary arrangements, have ranged in different districts as follows (in 100,000 people) :—

Cholera.	Diarrhœa and Dysentery.	Continued Fever.	Small-pox.
From nothing to 403	From 4 to 345	From 21 to 209	From nothing to 146

2. Annual death-rates, by diseases which to some considerable extent are inevitable, but of which the severity or the frequency may be controlled by good sanitary arrangements, have ranged in different districts as follows:—

Tubercular Phthisis in Women.	Non tubercular Lung diseases in Men.	Common Infectious Disorders of Children.	Convulsive Disorders of Childhood.	Pulmonary Affections of Childhood.
From 229 to 588	From 66 to 869	From 694 to 2149	From 280 to 3832	From 213 to 2897

From "papers on the Sanitary State of the People of England, p xxxv.

This question then must force itself upon the attention of every reflecting man :—Why should the mortality be greater in one locality, than in another? Why should not the average be the same all over the kingdom? Now, I must call your attention to two facts. (1) The average death-rate in towns is 26 in 1,000; while the average rural death-rate is only 22. So that towns are evidently far more unhealthy than the country. Thus Mr. Simon (the medical officer to the Council) says in his "Report of the medical officer of the Privy Council" in 1859. (p. 27.)

"In 1858 seven-tenths of the excess of deaths were suffered by the inhabitants of large towns, who do not constitute half the population of England."

The other fact is (2) that the local excess of death-rate is due to local circumstances; so that wherever it is higher than the general average, we must assume that there is some local cause for this variation. On this point also hear Mr. Simon's testimony: he says:

If it appears (as it presently will appear) that the inevitable

influences in question are in some districts of England greatly more fatal than in others, there will be strong prima facie grounds for believing that the *local excesses of fatality are due to local circumstances of aggravation*; that *these aggravating local circumstances are such as it is fully possible to counteract*; and that *of the total mortality ascribed to these influences in England a very large share is preventable..... thousands of deaths annually result from diseases which are, in the most absolute sense, preventable*; diseases, which either will not arise, or will not spread, in communities which follow certain well-known sanitary laws.—(Papers on the Sanitary State of the People. p. viii. ix.)

All diseases may be classed in two great divisions (1) *zymotic diseases*, or those produced by a ferment or putrefaction in the Blood. (2) Those which arise from *Privation*. But by the word Privation I do not mean only insufficient food; want of Ventilation is included in the term—a privation of fresh air, arising from scanty house-room, from close streets, from too much work in-doors (which is the case with clerks), or from breathing a bad atmosphere (from which tailors and compositors are apt to suffer.) But privation of food is also meant; and this may arise either directly (from insufficient quantity); or indirectly (from the quality being bad, from adulteration, or the admixture of innutritious substances). Having made this grand division, we must now consider the matter more in detail; and in doing so two objects must be kept in view; we must seek to deduce sanitary laws from observed effects, that is from general experience; and we must show the evil which always follows upon disobedience to those laws. Now, let us go back to those tremendous zymotic diseases which once ravaged the country, and which were thought to be utterly beyound the controulling skill of man, I mean the plague, and the sweating sickness.

Hecker says, in a book lately published "on the epidemics of the middle ages" (p. 292. 325.) that both the plague, and afterwards the sweating sickness proceeded from "noxious exhalations from "dung-pits, swamps, impure canals, offensive rubbish, foul rushes "(which were used instead of carpets) &c."

The streets in those days were undrained, unpaved, uncleaned; very narrow; containing all sorts of foulness, offal, sewage, dead cats, &c.

It has often been truly stated that "Every contagium is only animal matter in a state of transformation." This putridity or ferment may communicate disease, whether it enter the blood along with the air, through the lungs; or whether it passes into the stomach with the water which is drunk. The effect is still the same: the fermenting process is communicated to the blood, and the constitution, in trying to get rid of the offending matter, causes a disease akin to cholera.

The death-rate of this class of diseases (alvine flux) varies from 4 up to 663. And Mr. Simon says "If the diarrhœal death-rate

"of England generally were even *only ten times* the minimum "diarrhœal death-rate, there would be an annual saving in England of "nearly 20,000 lives."—(Papers on the Sanitary State. p. xi.)

The following fact is sufficient to prove how much the malignity of cholera depends on accidental causes.

In 1853 there were, in Newcastle, 2,000 deaths by cholera Yet in Tynemouth, (which is only 8 miles down the river, and has a stream of people constantly passing to it from Newcastle by railway) there were only 4 cases.

This immunity was not due to some difference in position; because in 1848-9 the cholera was very fatal in Tynemouth. The reason was that extensive sanitary measures had been adopted in 1851-52.

Cholera always picks out crowded places. It is very fatal in barracks. Five times as many soldiers as civilians died in 1849. The Cholera death-rate of .....

St. Pancras	civilians was	22 per 10,000
	soldiers (Regent's park barracks)	104 „
Kensington	civilians	33 „
	soldiers (Knightsbridge barracks)	175 „

(Journal of Statistical Society.)

Cholera is found comparatively harmless in well-drained, well-ventilated districts. It becomes violent only when in contact with miasms of putrefying matter.

Mr. Simon says:—"And any such distribution of diarrhœal "disease as has just been noticed warrants a presumption—indeed, so "far as I know, a practical certainty—that, *in the districts which "suffer the high diarrhœal death-rates, the population either breathes "or drinks a large amount of putrefying animal refuse.*"—(Papers on the Sanitary State. p. xi.)

You see, then, that air and water may convey poisons far more insidious than any which the Borgias used.

A similar cause also engenders typhus and typhoid fevers. *Typhus* fever proceeds from an unventilated atmosphere in crowded places, which are reeking with the steam of breath and perspiration; this condenses in fœtid drops on the walls, and soaks into the plaster or papering, and then produces the growth of fungi on the wall. This is very common in warm countries; and is seen as a discoloration of the wall. It is a leprosy in the wall. *Typhoid* fever, on the other hand, arises from pollution in air or water, and is chiefly caused by defective drainage. But I must quote authorities in support of these assertions, and not let them rest merely on my own testimony. Dr. Simon says :—

"The practical lesson, respecting which there is no difference of opinion, is admirably taught by the most eminent medical teacher* of the present generation, as 'the unquestionable fact that *fever* is

fostered and spread through those impurities which sanitary measures are intended to banish.' "

Traumatic Erysipelas, which was so fatal in the Scutari hospitals during the last war, arose from a similar cause. For air with only a slight putrefaction in it, affects the process of reparation in soldiers' wounds, and engenders an inflammation which frequently proves fatal to the brave man. The same is proved again by a fact which oocurred in the York Road Lying-in Hospital: there used to be 46 deaths for every 1000 deliveries; but this was reduced to 4, merely by introducing a system of proper ventilation through the wards. Racing stables are cleansed three times a-day, because it is found so advantageous to the health and condition of the horses. The same is proved by numberless other facts, which I have not time to adduce. We may, then, accept it as proved, that air and water, when only slightly contaminated, always act as most dangerous poisons. And so much for the first class into which we divided diseases.

Let us now pass to a consideration of the second class, viz., Pulmonary complaints, or, more properly, the diseases of Privation. On this point again I must refer to the same great authority :—

Pulmonary complaints cause nearly one-fourth of the annual mortality of England. The death-rate is 552 per 100,000 souls.

In Lancashire the death-rate is	706
North-Western District	683
Northern	463

50,000 persons yearly are registered as dying under that form called Phthisis; and 8,000 more deaths are registered under the name of scrofula. Both forms are comprised under the term " tubercular disease." When once contracted it is transmitted from father to child. So that the medical officer of the Board of Health remarks:— " This misfortune does not confine its consequences to the generation which first suffers them. Whatever tends to increase tubercular disease among the adult members of a population must be regarded as assuredly tending to produce a progressive degeneration of race." (Papers on the Sanitary State, p. xxii.)

Pulmonary complaints are induced by deficient ventilation, either by reason of a sedentary life, or want of active bodily exercise, or a listless state of mind: in short, by an insufficient oxydation of the blood. Here are my authorities for such an assertion. Dr. Watson, one of the greatest medical authorities of the present day, says :—

" If there be any diseased condition that is strictly the product of " impure air, it is scrofula."

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* Dr. Watson in his Lectures on the Practice of Physic. Fourth edition, vol. ii., p. 835. (Papers on the Sanitary State of the People p. xviii.)

And Dr. Simon says :—

"The great contrasts are found to lie between populations, respectively agricultural and manufacturing. *In proportion as the male and female populations are severally attracted to in-door branches of industry, in such proportion, other things being equal, their respective death-rates by phthisis are increased.*" (Papers on the Sanitary State of the People, p. xxiii.)

But exhaustion, either bodily or mental, tends also to develope these complaints. One prolonged, exhausting effort has been known to call into existence a fatal consumption; it has followed a long walk for a wager; it has resulted from over-reading at college. In fact, consumption may be called the disease of exhaustion, if that term may comprise the state produced by breathing impure, unoxygenated air. The result is in both cases the same—the work of destruction in the system is greater than the repair—whether this state be produced by want of food or want of air.

To consumptive persons influenza is generally fatal: but then their deaths are registered under "influenza," although consumption was really the fatal disease.

The pulmonary complaints are peculiarly fatal to children: and many children who escape actual death from this cause, live only to inherit a degenerate life. Listen to the testimony on this point of the Medical Officer to the Privy Council :—

It cannot be too distinctly recognized that *a high local mortality of children must almost necessarily denote a high local prevalence of those causes which determine a degeneration of race.*—(Papers on the Sanitary State of the People, xxvii.)

Dr. Greenhow's figures show a range of infantile death-rate by these diseases of the lung from 155 as a minimum to 2,397 as a maximum. The mother—whose tendency is to refer "taking cold" to out-door influences exclusively, and who, if her child's breathing ails, tortures her own conscience with doubts whether he has been exposed ever so little to one wind or another, and whether it would not be safer to keep him altogether within doors—might usefully study this part of the statistics. The more favourable of the death-rates under consideration are those of rural populations, the two lowest of all belonging to the two most northerly of Dr. Greenhow's 105 districts; while the high death-rates eminently belong to towns.—Ibid, p. xxxiii.

Their conjoint operation is to destroy every year about 72,000 children, and thus to occasion about a sixth part of the total mortality of England. They are eminently the diseases of towns, perhaps especially of great manufacturing towns.—Ibid, p. xxxi.

The average death-rate produced by these disorders in three of the healthiest rural districts of England taken together is 925; in the unhealthiest district of England the corresponding death-rate is 6,895. Why are these non-infectious infantine complaints seven times as fatal in one district as another?

In proof of the fact that want of fresh air causes consumption, Dr. Arnott mentions a curious and instructive circumstance in his Evidence before the Health of Towns Commission. He said that a new room was built for monkeys in the Zoological Gardens. There was every appliance for

warming the room; but it was ventilated only through the wainscoat. The heated and impure air ascended, and could not escape; and thus the room was (he said) an inverted receiver for bad air. The monkeys had flourished through many winters in England; but as soon as they were put into this new room, they began rapidly to die of consumption. This was the result of a want of fresh air. They lived in a bad room with good air; but died of consumption in the best room, because it was not thoroughly ventilated.

The Investigation into the Sanitary State of the Army has proved the same law. Remember that only the healthiest men are admitted into the army. Recruits are examined by a surgeon, and every one that is not strong is rejected. Of these, many, who show symptoms of incipient ill-health, are sent home as invalids. So that the subjects of the investigation were not only healthy men, but men with robust constitutions. Now the soldier leads an idle lounging life, he has no active employment; but suffers from ennui, and becomes listless and dissipated. He is moreover crowded in barracks where there is insufficient ventilation. And accordingly we find that Fever and Pulmonary complaints are a soldier's worst enemies; but more especially the latter. The foot suffer more than the horse soldiers; because the latter have to clean and exercise their horses in the open air. Horse-soldiers, moreover, have a larger barrack-room. [*See Note.*]

You must not suppose that the mortality among soldiers is caused by the severity of their duties: the duties of policemen and of sailors are far more severe; yet the death-rate is by far the greatest among soldiers, as you will see by the following table, which is taken from the Report of the Sanitary Condition of the Army:—

Deaths per 10,000 at soldiers' ages (40—60):—

Agricultural labourers (members of friendly societies	60
Civilians	63
Navy, home stations (N.B.—The navy are much exposed; and over-crowded at night	68
London Fire Brigade.....	70

Note.—From a return moved for in 1848 of the cubic space of air in barracks, we find that in Dover Castle there is a space of 147 cubic feet; while paupers in Scotland are allowed 480 cubic feet per man. Moreover, paupers never remain in the dormitories by day; while soldiers are in their barrack-rooms day and night. The new barracks are, however, much better in this respect But in p. xxxv. of the Report of the Commission on the Sanitary State of the Army in 1858, we find that in

	FEET.		FEET.
London Hospitals, least space	800	average	1434
County „	600	„	1081
Military „	400	„	632

Out-door Trades in towns	85
London Police	89
Average of 24 large towns	119
Average of Manchester	124
Household Cavalry	111
Dragoons	135
Infantry of the Line	178
Foot Guards (who are an guard only every 5th night)	204

—(Report of the Commission on the Sanitary State of the Army, p. xi., xii., xv.)

You see that these "aristocratic" regiments, the Foot-guards, rejoice in having a night-guard every 5th night only; but their privilege is their bane; for more of them die in consequence. But that which I am proving will be still more apparent from the following fact:—

"The mortality of the army when *hutted* before Sebastopol in 1856, as compared with that of troops *in barracks* at home was nearly one-third less than the mortality of the infantry of the line and two-fifths less than that of the Foot Guards."—(Report of the Commissioners on the Sanitary Condition of the Army, p. xvi.)

So that those miserable huts, about which the *Times'* correspondent wrote, which were full of crannies and crevices, and let in the wind and water, and snow and frost, were far more healthy than barracks which excluded the elements.

And again in the same Report we read, with regard to the troops in barracks:

"In considering the effect on health of the constant breathing of a vitiated atmosphere in barracks, it must be borne in mind that 57 per cent of the deaths in the infantry of the line are caused by diseases of the respiratory organs; and of the guards no less than 68 per cent." p. xvii.

It has then been proved that a man may suffer exposure, be badly clothed, and badly fed; he may even breathe bad air at night; yet if he have plenty of labour in the open air, he may save his health intact, and enjoy a long life, free from sickness. While those, on the contrary, who enjoy every advantage which wealth and leisure can afford them will, if they have no strong exercise in the free air, suffer from maladies which will embitter their life, and will close their sorrows by an early death. To show the evils of bad ventilation by an additional instance let us take the case of bakers:—

Bakers work 18 to 20 hours a day in London; in rooms, many, under ground and badly ventilated. And we find that although of Scavengers only 19 in every 100
and of Carpenters and Bricklayers } only 25 in every 100 are subject to pulmonary diseases; yet of bakers 70 and even 80 per cent. are found suffering from these complaints.

We have seen the baneful effects of vitiated air, and of impure water. The evil consequences of an insufficient supply of fresh air, have also been made apparent. There is one more

sanitary law, whic' is quite as important as those, namely, the evils which resultfrom an insufficient use of fresh water. As refuse is given of in the breath, by the lungs, so also is the system freed fro many refuse salts, by the skin. And as the air, which has ben expired, acts as a poison if it enters the lungs again ; so f the skin be not constantly freed by frequent ablutions of fres water, and by frequent change of clothing, it will be poisone by absorbing again, that which it has already exuded. Therare about 3,528 pores on each square inch of skin. Each pore is th termination of a tube which is ¼ inch long. Now there are on s average 2,500 square inches of surface on a man's body. So th if you assume that there are no more than 3,200 pores per squ'e inch, you would have eight millions of pores and two million ches of perspiration tubes, which is equal to 31½ miles.

Now of *insensible* perspiration alone, there are 25 oz. in 24 hours (accoding to Krause), containing 120 grains of animal matter, and 4grains of mineral. Consider therefore the disturbance which is cated if these pores be stopped.

I hav now stated the most important sanitary laws, and shown t causes of preventible diseases ; I have also illustrated t se laws by a reference to the particular diseases attendar on the various trades, occupations, and conditions in]ife. here are facts innumerable which prove the truth of these ws, by making manifest the beneficial results which accruerom an obedience to them.

N.—The following facts were related by Mr. Cowper (lately Presiat of the Board of Health) in a lecture which he delivered last winte

I'ombe's Book on Physiology it is stated that not 1 in 24 of the pauper childn in the London workhouses lived to be a year old (because they wereought up in impure air), so that out of 2,800 infants, received into the rkhouse in the year, 2,690 died. When the conditions of health came to bbserved, this mortality was reduced to 450.

]the establishment for pauper children at Norwood, the average death-rat 200 in 10,000, which is only one half of the death-rate among the clas from whom those children are taken. And neither typhoid fever noeasles have ever originated in the building.

the military school at Chelsea, in consequence of attention to ventilat, cold bathing, and other sanitary arrangements, the death-rate has bereduced from 95 to 45 per 10,000. And the number unfit for military sece has been reduced from 124 to 46 per 10,000.

'risons must, *cæteris paribus* be more unhealthy than other places; buse depression of mind, and consciousness of guilt have a great tendcy to induce bad health. Yet in Brixton prison, of those women who ve healthy on arrival, only 80 per 10,000 died in 1858, while 340 per 100 die among the needlewomen of London. This is because sanitary angements are strictly observed.

In Pentonville prison the death rate is one third of what it is among same class in towns.

Dr. Southwood Smith says (Results of Sanitary Improvement):—

"By enforcing scrupulous cleanliness we have for some time banish-

But there is not time to detail these facts at present. You will surely grant that it is worth while to go to any expense in order to perfect the drainage of the town, to obtain a good water supply, and secure an abundance of pure air; and that frequent personal ablutions and change of clothing are no less necessary and beneficial to those who consistently adopt such a course. The success which has attended Sanitary legislation, has proved the correctness of the science on which that legislation has proceeded. The effect of the "Lodging Houses Act of 1852," for instance, has been increased health, and decency

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ed typhus fever from our Union workhouses, and from prisons; and now, by giving to the houses of the industrious classes efficient drainage, and a good supply of water, we have placed around these dwellings a barrier which this mortal pest of our towns and cities has not been able to pass."

In 1849 the cholera death-rate was 71 times greater in the city of London than it was in 1854; because there had been established a sanitary government, which daily sent out scavengers. Moreover the deaths in 1854 occurred in houses which were peculiarly filthy and offensive, where the drains were untrapped, or where the inmates had excluded fresh air.

(From Dr. Simon) Cholera mortality per 10,000:—

		in 1849.		in 1854.
West London Union	(South sub-district)...	118	..	11
"	(North)	70	..	9
City	(South-West district) .	107	..	17

And (see Papers on Sanitary State, p. xiv.) in 1848, in the southern parts of London, one district was drinking a good water, and another drank river water which contained impurity. In other respects these districts were the same. Yet the cholera death-rate in the latter was greater, than in the former. But in 1853 the company which had supplied the worst water now changed, and sent better water than the other company, so that the case was reversed; and the cholera death-rate in the district which had been the most deadly was so much reduced, that the death-rate in the healthier district was 3½ times as great.

Dr. Southwood Smith reports that in Lambeth-square there were bad flat-bottomed, untrapped drains, and insufficient water supply. The death rate in 1851 was nearly 51 per 10,000. These three defects were remedied in 1852, and it was found that the mortality was reduced, even during the severe cholera epidemic to 130 in 10,000.

In Macclesfield the death-rate used to be 330 per 10,000; but it has been reduced to the rate of 260 during the last 5 years, so that 1,015 lives have been saved; there have also been 28,420 fewer cases of sickness, so that the sick and burial clubs have saved £8,729 in funeral expenses, and saved £28,420 (it is estimated) in sick-allowances during those 5 years.

According to the Registrar-General's Report for 1856, it appears that the death-rates in Manchester and Salford have been reduced in consequence of sanitary improvements.

In	1854	the death-rate was	322 per 10,000.
"	1855	"	319 "
"	1856	"	270 "

According to a late Report, I find that there is a very striking reduction of the death-rate in the Bradford district, owing to the same cause.

From 1841 to 1854 the death-rate used to be 260,
Latterly..... 210,

and the Registrar says that this improvement took place before the full completion of the sanitary works.

The Broadwater Registrar said last year—"The deaths are 20 per cent. below the average, very few having occurred in the town of Worthing, viz.: only 17 out of a population of 8,000. I attribute this result principally to the complete sanitary measures carried out in the town, under the supervision of the Board of Health."

of manners; and a greatly diminished death-rate, especially among children.

In the houses of the "Metropolitan Association for improving the dwellings of the Poor," the mortality in 1853, was only 7 per 1,000, while in the rest of the Metropolis it was 22.

In the houses of the Association the death-rate of infants was 10, while in the rest of the Metropolis it was 45.

Twelve per cent of all the deaths in London are from fever; but up to 1854, there were no cases of fever in these improved dwellings.

One hundred thousand people sleep nightly in houses licensed under the Lodging Houses Act; and last year (1859) there were only 2 or 3 cases of fever among them all.

In Wigan in 1854, out of 30,000 lodgers, there was not a case of fever in any house where the Act was in force.

In Wolverhampton, out of 511,000, no case of fever occurred, after the act was put in force in July 1852, up to 1854 at least.

The same reports came from Morpeth and Carlisle.

By the Lodging Houses Act ventilation is enforced, overcrowding prevented, and the walls have to be kept clean and whitewashed.

I may as well mention another very curious fact to show that *physical* and *moral* degradation spring from the *same cause*, and go hand in hand together.

Mr. Jelinger Symonds laid statistical records before a meeting in Birmingham, showing that density of population, and the rate of crime vary together: i. e. the amount of crime for every 1,000 persons is much greater where the people are crowded together, than where they are spread over a greater space. Just in the same way as the death-rate and density of population vary together.

Living in filth debases the mind, and destroys all self-respect; while bodily exhaustion and malarious depression drive people to seek a stimulus in intoxicating drinks. And if these are the effects on adults, what must they be on the plastic and tender mind of children? For the circumstances which surround a child are its education, and form its character for good or for evil. Thus, neglect of sanitary measures causes intemperance, (and this in itself is a waste of money); thereby crime is increased, and all the concomitant expenses of trials, and police, and prisons are incurred, and here is more money lost. And to this must be added the sickness which, is engendered; and the amount of productive labor which is thereby lost to the country; and the hospitals which have to be supported; and the dispensaries and hospitals

to be maintained; and the poverty entailed; and the increase of poor-rates; and the asylums which become necessary for the widows and orphans. You must allow that neglect of sanitary laws causes the greatest drain on the resources of the country. It may cost something to carry out the necessary sanitary arrangements; but it costs much more not to do so.

I will mention one instance to prove that sanitary neglect is the most mistaken parsimony:—

"The contingent expenses for the maintenance of widows and orphans whose claims arose out of that four months' visitation (of cholera), appear to have amounted within the next four years to £7,500. The costs (direct and indirect) of the epidemic at Newcastle and Gateshead was estimated at about £40,000, over and above the large losses sustained from the temporary stoppage of trade."—(Papers on the Sanitary State, p. xii.)

Depend upon it that filthy houses, undrained towns, swamps in the country, confined workshops, night-work and excessive hours of toil, *are paid for by the rate-payers.*

It is a wise adage that "a fool may see the penny which he takes out of his pocket; but only the wise man sees the penny which stops in."

Sanitary authorities therefore desire to get rid of sewerage in order to purify the air. But that which is injurious to towns is beneficial to the country: that which destroys life in a population, will fertilize the fields and thus support life. That which is worse than worthless, when out of place, becomes of the highest value when transferred to another place. The Scotch have a true saying, "Muck is the mother of the meal-kist." The town has to pay high rates, to get rid of that which the country can ill-afford to spare. For the elements of fertility in the soil are not inexhaustable; if they be not constantly replaced, the supply of them must very soon fail For the earth, like the pelican, tears open her breast and destroys herself to feed those who live upon her.

Note.—"A child can comprehend that, under these circumstances, a very productive field, in order to remain very productive, or even simply productive, must have the elements which had been withdrawn in the harvests, perfectly restored: that the aggregate of the conditions must remain in order to produce the aggregate results; and that a well, however deep it may be, which receives no supply of water, must in the end become empty, if its water is constantly pumped out. Our fields are like this well of water. For centuries those elements which are indispensable to the reproduction of the crops, have been taken from the soil in those crops, and that too without being restored."

"The loss of those elements is brought about by the sewerage system of towns. Of all the elements of the fields which, in their products, in the shape of corn and meat, are carried into the cities, and there consumed, nothing or as good as nothing returns to the fields. It is clear that if these elements were collected without loss, and every year restored to the fields, these would then retain the power to furnish every year to the cities, the same quantity of corn and meat; and it is equally clear that if the fields do not receive back those elements, agriculture must gradually cease."—(Dr. Liebig's letter to Mr. Mechi. *Times*, Dec. 1859.)

You perhaps have little idea of the value of this manure. There is not time for more than a very cursory mention of facts bearing on this part of the subject:

80,000,000 tons of sewage flow annually into the Thames.

Without the aid of any other manure this would fertilize 5,000 square miles.

Now, it has been stated by an able engineer that 750 tons of this material can be delivered to a distance of 100 miles round London (when the requisite works are constructed) for less than the farmer now pays for one ton of guano.

According to Liebig 10 tons of sewage are equal to 130 tons of stable manure.

Mr. Smith, of Deanston, estimates the clear gain of a town (deducting every expense of transport, &c., and allowing for increased profits to the farmer) at £1 for each inhabitant annually; Dr. Lyon Playfair puts it higher, estimating the value at 37s.

The sewage of London alone is reported to be worth half-a-million yearly.

The whole sewage of the British isles would, in 20 years, pay off the national debt.

It is easily distributed by means of a hose and the common farm engine. And such a method of distribution is much cheaper than carting. [*See Note.*] Not long ago some large tanks of a mill were silted up; and the firm to whom the tanks belonged called for contracts for cleansing the tanks. A young engineer took the contract; and it occurred to him that he might turn on some water (which was at hand) and puddle the clay, and then pump it out. He tried the experiment; executed the work; and saved many hundreds of pounds. Consider what has already been done in order to supply the metropolis with water; could not the same be managed to carry away the water, with the impurities, which it bears, to fertilize the fields in the country?

Note.—The means of application are simple. Mr. Hawkesley (engineer) in his evidence, offers to send water, or any liquid, a distance of five miles, and raise it 200 feet, *after paying all expenses, and interest on the capital expended*, for 2½d. a ton.

The expense of sending one cart of stable mannure the same distance would be 4s.

Where coals are 12s. a ton, the expense of raising 43,000 gallons of water 100 feet high, by a Cornish engine of 25 horses, is only 1s.; and with an engine of 189 horses, 80,000 gallons can be lifted for the same price.

A 12 horse power engine will distribute 180 tons per day (by means of a hose ¾ of a mile long, which can be laid over hedge or ditch) over a farm of 400 acres, for less than ½d. a ton. Only one man is required to move the hose, and one to direct the nozzle.

All the farm-yard manure can be thrown into a tank to rot, and distributed in a similar manner over the farm.

The water for London is taken at 12 o 15 miles distant, and distributed at the tops of the highest house at the rate of 1*d.* for 200 buckets full.

More than 81 millions of gallons are supplied daily by the water companies through upwards of 2,000 mils of main pipes and branches; and, with engines equal to 7,000 horse-power, the cost, (including 200 acres of built filters and reservoirs) was only 5 millions.—(Report on the Water Supply of the Metropolis, 185, p. 99.)

This distribution of sewerage has been tried at Rugby, at Liverpool, Malvern, Watford, Mansfield, and at many other places and has always been found to answer. The effect on the Craigtinny meadows, near Edinburgh, was perfectly marvellous; sandy land which let for 2s. 6d. an acre was by these means raised in value till it let for a yearly rent of £9 an acre. They cut annually as many as seven crops of grass off these meadows. In a letter which appeared in the *Times* on the 17th of Nov. the following fact is mentioned: "At Carlisle the entire volume of sewage is pumped up, and applied to some 50 acres of land by means of surface irrigation. The capital sunk was under £1,000." Since which it has been stated* that the necessary machinery cost only 50s. an acre; and that the sewage is distributed at the rate of ¼d. per 5½ tons.

There is a beautiful analogy between the life of a town and that of a human being. In a man the pure fresh blood issues from its fountain, and passes through large arteries, and branches off to all parts of the body, through many capillaries which become smaller and smaller, and more intricate as they proceed. That blood then takes up all the impurities in the flesh, and effete constituents of the the worn-out muscles. This venous blood, blackened with impurities, passes through other little capillaries into larger and larger veins, back to the organ from whence it came. So for a city, the water wells up from the earth, and passes through mains to the town where it proceeds through

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Note.—As to the first cost of establishing such a system over a farm with glazed stoneware main Pipes, and with cast iron collars, Mr. Raumell gives the following estimate, for a 250 acre farm:—

1,100 lineal yards: of 4 inch pipes and collars at 1s. 6d...	82	10	0
4,400 ditto, 3 inch ditto, at 1s. 1d.....	288	6	8
Laying and jointing, at 6d.....	137	10	0
25 Hydrants and fixing, at 20s.....	25	0	0
	483	6	8

or £1 18s. 8d per acre.

The pipes are laid under ground; and the hydrants are above ground in convenient places for tapping the pipes. A hose is fixed to one of these hydrants to distribute the water.

A hose of prepared canvass lasts 6 years, and costs 1s. a yard. 1,000 yards may be worked by an ordinary farm engine over elevations of 40 or 50 feet.

* Letter from G. Shepperd, Esq., of Throgmorton Street. See *Times* Nov. 26.

smaller ramifications to every house; here it takes up all impurities, passes through small pipes to the main drains, and should be returned to the earth from whence it came.

It is now time that I should draw to a close. But I must remark to you that all these sanitary laws were commanded thousands of years ago on Mount Sinaï.

Many of the Mosaic laws are for the physical,—as the rest are commanded for the moral well-being of the people.

Moses tells the people that, by following those laws many diseases would be prevented.

"If thou wilt diligently hearken to the voice of the Lord thy God . . . . and keep all His statutes, I will put none of those diseases upon thee." And again, if they observe these laws, "The Lord will take away from thee *all* sickness."

And what were they commanded to do?

To avoid all uncleanness, and instantly remove all refuse, To use plenty of cold water. To guard against physical exhaustion. To avoid over-crowding the population. And these are the very laws which are taught by sanitary Science.

One of the Laws of the twelve Tables in ancient Rome was, I believe, that no two houses should touch; but that a space of five feet was to be left between them. The ancient town of Pompeii struck me very much: every house stands separate in that town, which was preserved as an example to us, under the cinders of Vesuvius.

Then again the Jews were not allowed to keep pigs, for the rearing of swine is most injurious. During the cholera, the authorities found it necessary to eject 3,000 pigs from Sunderland. And in the "potteries" (near Kensington) there were three times as many pigs as inhabitants, and the mortality was from 40 to 60 per thousand. Fever in one year killed 128 people out of 1,000.

Thus, after 3000 years of scientific investigation, and experience of sickness and death, we have merely found out the necessity of following intelligently those very laws which the Jews obeyed implicitly.

I think I have now shown you that the necessaries of health, the true elixirs of life, are not expensive, but the most ordinary materials;—namely, plenty of good air and fresh water. You have seen that illness and death must follow from a system which robs the fields of their due fertilizing agents,—that famine and pestilence walk together over the land to restore the balance between food and population. I have said enough to make you

see how foolish and false is the notion that sewage is horrid or worthless :

> For nothing walks with aimless feet,
> And nought can ever be destroyed,
> Or cast as rubbish to the void,
> When God shall make the pile complete.

Nothing is ever annihilated. What you call destruction is merely a separation into simpler compounds of elements. And again, how continual is the reconstruction! For plants live by taking up simple compounds from the earth, and combining them into more complex forms ; and animals live by taking the complex atoms of vegetables, and combining them still more, and forming a higher rank of atoms. And so it goes on in an ever-enduring cycle, while sun and moon travel in their great orbits, till God shall make the pile complete.

I have now said enough to show you the importance of the subject ; and already too much to tax your patience with. I thank you most heartily for the kind consideration with which you have heard me. You will surely agree with me, that if murder by violence is to be investigated, and if the strong arm of the law is then to be called in, the same should be the case too, with respect to murder by slow poison in the air and water, where no one recks or interferes. There is great opposition shown in many places to sanitary reform. But so there was to the removal of the smoke nuisance. Yet now they find a gain in so doing ; for a 100 horse-power engine in Cornwall, by consuming its own smoke, saves 36s. a-day, even when coals are only 5s. a ton. The Gas companies showed opposition when they were prosecuted for allowing ammoniacal matters to flow into streams ; but when they were obliged to retain them, a trade arose in those very matters, and they became a gain to the companies. In fact, all nuisances are merely defective processes, just as illness or disease is merely a defective process in the human body. The smell of the nuisance is a hint that the process is defective, just as discomforts are the symptoms of defect in the processes of the human organism. I know that I should now appeal to you on higher grounds, and remind you that right and justice are worth more than money; and merely show you that sanitary laws were commanded on Mount Sinai. But I may tell you too, that godliness is great gain, because it has the promise for this life as well as the life to come. You cleanse your fields ; then cleanse your house property also. You drain your fields ; then drain your houses also. You import guano a distance of 15,000 miles, while you neglect a better than guano at home. The smell reminds you of the escape of your wealth ; and the engendered sickness sends more good money after

that which you have already lost. In China there is a most stringen law against losing any sewage; in Piedmont, Switzerland Flanders, Belgium and France it is preserved, and farmers give the greatest fertility to their land with the least expense to themselves. But in our country the air is too often charged with unwholesome vapours from overloaded sewers; rivers and springs are poisoned by that which would bring unexampled fertility to our farms. The impure atmosphere and fœtid waters invite the cholera and typhus fever. The destroying Angel stands with one foot on land, and the other on the waters, and calls to us with a loud and potent voice to remedy the evils which still exist; and we see our brave populations swept away, and the strong man bowed down, and the proud beat of the young heart for ever stilled by a breath from the grave. Working men contended for a prize to be given for the best Essay on Sanitary Reform, and the umpire (Lord Shaftesbury) said that the impression on their minds of the necessity of sanitary reform was truly wonderful. But we are like children sitting in the market-place, perversely refusing to sympathize with the joys, or feel for the sorrows of our fellows. We say to ourselves; *our* air is sweet; what care we if the Thames be poisonous? Lazarus yet sits at Dives' gate, full of sores. But Lazarus is neglected still.

"And yet it ne'er was in their soul to play so ill a part.
For evil is wrought by want of thought, as well as want of heart."

Just think of the poor houseless wanderer,—her nakedness scarcely hidden by the filthy rags which hang draggling about her,—as she splashes, on a wet and heavy winter's night, through the mud of deserted streets. And she stops at the sound of joyous music, and looks up at the flitting shadows which dance across the window-blinds of a gorgeous gilded ball-room Dejected and sick at heart, her head falls again on her breast and she plods home to the small reeking cellar, full of filth and misery. There is the wretched, rotting pallet, which is all that she and her family have to rest their weary limbs on: and on it she finds the pale, cold, lifeless form of her child. It has been murdered by the fœtid air and polluted water of the metropolis. And she says, as she lies down beside it, "Thou hast gone indeed before, but hast not lost much joy." Believe me that this subject is of the greatest importance for the welfare of the people. Sanitary Reform should everywhere be studied, not merely to save yearly the lives of some 100,000 Englishmen, (although that is a great and worthy object), but also for the sake of their moral condition and the influence which it exerts upon the rising generation.